RESEARCH CONTRIBUTIONS

OF

VYASA

Vivekananda Yoga Research Foundation

Volume - 1

THERAPEUTIC APPLICATIONS

OF

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Research Contribution of VYASA

Volume - 1

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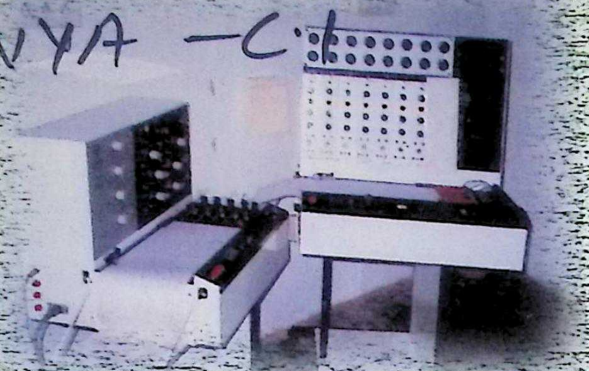

'Research contributions of — VYASA (Vivekananda Yoga Research Foundation)' is a compilation of all published full papers (59) of VYASA from 1980 to 2002. Volume - 1 contains the full papers on Therapeutic Applications of Yoga (YT) and Volume - 2 includes all other publications covering the areas of Physiology of Meditation (MP), Physiology of Pranayama (PP), Yoga for Perception and Performance (YPP) and Yoga for Rehabilitation (YR). Of these 59 papers 19 are published in international indexed journals and 29 in national indexed journals, 8
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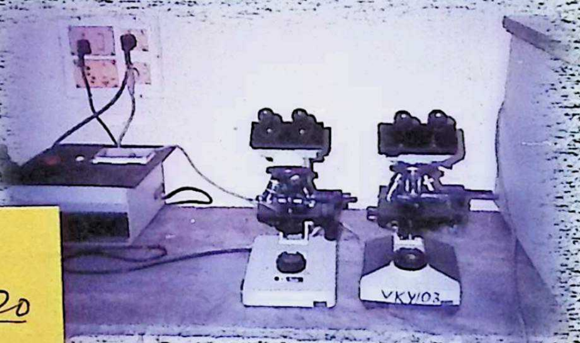

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COMPILATION

OF

PUBLISHED RESEARCH PAPERS

AND

RESEARCH ARTICLES

of

Vivekananda Yoga Anusandhana Samsthana

(Research Foundation)

Volume I : Therapeutic Applications of Yoga

Vivek Kutir, No.9, Appajappa Agrahara
Chamarajpet, Bangalore - 560 018
Karnataka (State), India.

BY

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VYASA

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(The Publications Wing of VYASA)

"Research Contributions of VYASA" comprising 59 articles is a reference book for scientists. professionals, yoga researchers and practitioners. It includes 56 articles published in International and National (indexed and non-indexed) journals and 4 articles as chapters in books. All these publications are based on the research work done by the "Research Team" of this institution since 1982.

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PREFACE

The work started way back in 1977 in Kanyakumari to unravel the hidden secrets of Yoga by systematic internal research and literature search. The central question was "Can Yoga be useful to solve the challenges of our society such as stress, psychosomatic ailments, social disharmony, student unreset, family divorces, increasing gun culture, terrorism, drug culture and so on?" Initially we took up Yoga as a therapeutic tool and for stress relief.

After going round the country visiting various Yoga institutions, meeting famouns Yoga masters, we came back to set out suitable modules of Yoga practices for different ailments. We combined the latest research knowlede base available in modern medicine with the principles and practices of Yoga. The result was the emergence of the Integrated Approach of Yoga Therapy (IAYT); the basis was culled out from Taittireya Upanisat and Yoga Vasistha. This paper was first published in Yoga Review in 1984, which was our first scientific publication. We started using this IAYT in the treatment of various categories of diseases such as asthma, diabeted, hypertension, etc. Systematic documentation of measurements made on the patients before and after Yoga and the later long term follow up, brought out highly significant improvement in the health status. These clinical trials were published and our first major publications was the one in British Medical Journal and Yoga for Bronchial Asthma. And the next was in Journal of Asthma in USA. Since then we have never looked back. More and more researchers were drawn, the research team started functioning with zear, enthusiasm and commitment to examine the usefulness of Yoga in stress management,Yoga in Education, Yoga for development of eyesight, memory, IQ, perception, stamina, creativity, etc. We also started research to understand the physiological and psychological aspects of various Yoga practices - the basis research initiated by swami Kuvalayananda in the 40's and 50's. The effect on the nervous system were studied by measuring autonomic functions through polygraphs in our neurophysiology lab. Soon we started our investigations using experimental psychology lab to unravel the effect of Yoga on various dimentions of the brain capacities. In all these investigations there were such positive results that our enthusiasm and faith increased to take up more exacting research, needing more funds.

Understanding the mechanisms involved in the causation of diseases at physiological, biochemical, immunological and psychological levels was our next launch, which continues even now.

We also took up research to understand and unravel the subtler, unseen dimentions of Yoga. The question was, "Can we recognise and photograph pranic body? Can we measure prana? Can we track the mind, its manifestations at the brain funcitoning level? Can we differntiate mind with intellect and emotions? Can we bring the philosophical studies of consciousness into more consciousness into more concrete terms?", and so on and on. Our search has expanded into alternate year in our headquarters - a science campus named Prashanti Kutiram. The provision for doing Ph.D. in Yoga and ailled sciences gave a quantum jumb into our research after we go the recognition form Bangalore adn Mysore Universities.

We compiled the titles of all our research publications in compendium entitled "Research Contributions of sVYASA". The two conference proceedings, which have been brought out. give the full papers published in these conference.

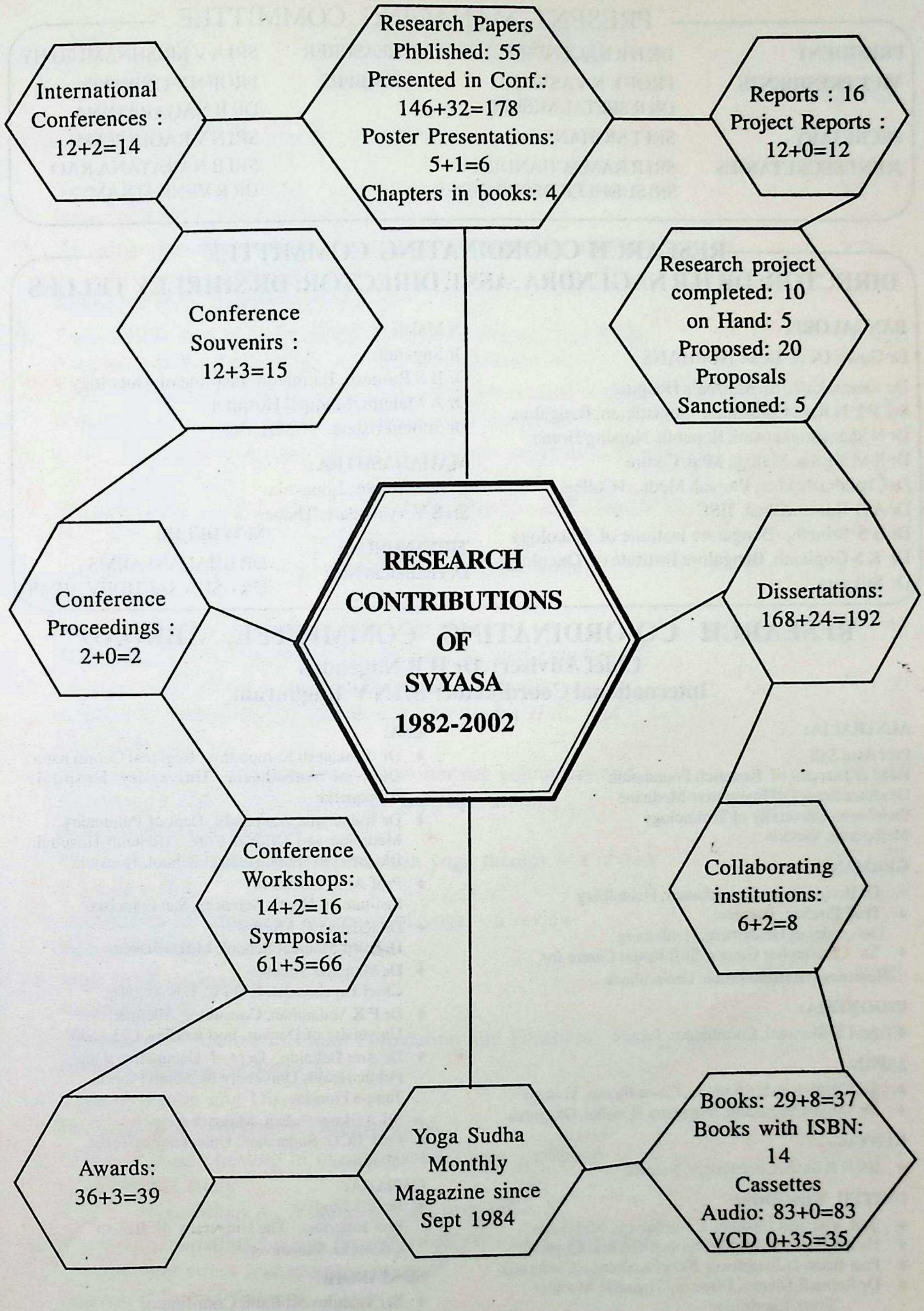
The present publication is a compilatino of all our important research papers published in indexed and non indexed national and international journals, conference proceedings (not our own conference proceedings) and as chapters in books.

The papers have been arranged in the following sequence -

1. Physiology of Meditation Techniques
2. Physiology of Pranayama
3. Therapeutic applications of Yoga
4. Yoga for rehabilition and
5. Yoga in perception and performence

The purpose of bringing out this research compilation in not commercial. There has been a request for reprints for all our publications by genuine research round the globe and hence the need was felt for bringing out this compilation. This compilation of 55 reserach papers and the four articles as chapters in books, we hope will be of great use to the medical professionals and other scientists to take up more and more research in yoga and its applications.

We thank all persons who have helped in bringing out this publication of VYASA



RESEARCH CONTRIBUTIONS OF SVYASA 1982-2002

International
Conferences :
12+2=14

Research Papers
Phblished: 55
Presented in Conf.:
146+32=178
Poster Presentations:
5+1=6
Chapters in books: 4

Reports : 16
Project Reports :
12+0=12

Conference
Souvenirs :
12+3=15

Research project
completed: 10
on Hand: 5
Proposed: 20
Proposals
Sanctioned: 5

Conference
Proceedings :
2+0=2

Dissertations:
168+24=192

Conference
Workshops:
14+2=16
Symposia:
61+5=66

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institutions:
6+2=8

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36+3=39

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THERAPEUTIC APPLICATIONS OF YOGA

British Medical Journal Vol. 291, 19 October 1985 1077-1079

CLINICAL RESEARCH

YOGA FOR BRONCHIAL ASTHMA: A CONTROLLED STUDY

R. Nagarathna, H.R. Nagendra

Vivekananda Kendra Yoga Research Foundation, Bangalore, India.

Abstract: Fifty three patients with asthma underwent training for two weeks in an integrated set of yoga exercises, including breathing exercises, suryanamaskar, yogasanas (physical postures), pranayama (breath slowing techniques), dhyana (meditation), and a devotional session, and were told to practise these exercises for 65 minutes daily. They were then compared with a control group of 53 patients with asthma matched for age, sex, type and severity of asthma who continued to take their usual drugs. There was a significantly greater improvement in the group who practiced yoga in the weekly number of attacks of asthma, scores for drug treatment, and peak flow rate.

This study shows the efficacy of yoga in the long term management of bronchial asthma, but the physiological basis for this beneficial effect needs to be examined in more detail.

INTRODUCTION

Yoga has been used to treat patients with asthma for over 50 years in yoga centres in India. Goyeche et al and several other workers have shown convincing evidence of the beneficial effects of yoga in patients with bronchial asthma. Most of these studies were short term, performed without controls, or qualitative but based on subjective judgments. Our earlier investigation clearly indicated the short term (two to four weeks) benefits of yoga, as established by standard controlled studies on large numbers of patients who underwent yogic training as outpatients. Prospective long term studies using standardised research procedures are however unavailable.

It is well known that the clinical course of a disease like chronic bronchial asthma is highly variable, being subject to many known and unknown factors. We carried out this long term study with matched controls to ascertain whether yoga could have lasting influence on the course of the disease.

PATIENTS AND METHODS

Table 1 shows details of 106 patients with established bronchial asthma satisfying the clinical criteria of Crofton and Douglas and Shivpuri that were included in this study. The age range was 9 - 47 years with a mean of 26.4 years. There were 15 women in each group. Fifty three pairs of patients matched for age, sex and type, severity, and duration of asthma were selected from a bigger group who came to our out patient clinic for yoga therapy. One from each pair was randomly selected for training in yoga, and the other served as control.

Although all 106 patients were equally motivated to take up yoga, the 53 randomly allocated patients willingly served as controls. They continued taking their usual drugs during the study.

All techniques of measurement, the length of each interview, and the people recording the data were the same for both groups. The yoga group attended a training programme of two and a half hours daily from 18.00 to 20.30 hours after work for two weeks. They were introduced to an integrated programme of the following selected yoga exercises.

Table 1 *Details of Patients*

	Control Group	Yoga Group
No. of patients*	53	53
Men	38	38
Women	15	15
Mean age(Range)*	26.41(9.42)	26.36(9.47)
Mean Severity Score for asthma (Range)*	1.45(0.3)	1.45(0.3)
No. with Seasonal asthma*	33	33
No. with Perennial asthma*	20	20
Mean weekly no. of attacks(Range)	3.55(0.7)	2.9(0.7)
Mean weekly Drug treatment (Range)	10.26(0.49)	6.22(0.21)
Mean Peak flow rate (liters/min)(Range)	290.1(60-580)	264.2(60-690)

**Group matched for these variables*

Breathing exercises (5 minutes)- five types of rhythmic, comfortable breathing techniques associated with simple hand and body movements, Sithilikarana vyayama (Yoga exercises to loosen the joints) and suryanamaskar (five minutes).

Yogasanas- (a) General yogasanas (20 minutes). Simple physical postures (in the standing, sitting, prone, and supine positions), performed with smooth, comfortable bending movements and slow breathing procedures. The asana practices end with the subject maintaining the final posture with the body relaxed (b) Savasana (10 minutes). Deep relaxation to relax the muscles regionally followed by conscious slowing of breathing and calming of mind.

Pranayama (10 minutes)- Four types of special breathing techniques performed with comfortable, slow, deep breathing.

Meditation and devotional session (15 minutes)- slow mental chanting of the syllable "OM" leading to slowing of mental activity. The devotional session was meant to harness the emotions, resulting in a feeling of freedom.

Kriyas (weekly)- Traditional voluntary nose and stomach wash techniques (neti and vamana dhouti) followed by Savasana.

Lectures and discussions - These were based on yoga philosophy and therapy.

We instructed 53 patients to continue the 65 minutes of yoga daily during the follow up period. For the purpose of analysis those patients who stopped the practices or did not practise for more than 16 days each month were eliminated from the study. Although we continued to record their progress. Twenty five patients dropped out of the study: seven after six months of follow up, seven after 12 months, two after 18 months, four after 24 months, and five after 30 months. All patients reported for check ups at intervals of six months. The frequency of visits and the relationship between doctor and patients were the same for both groups.

At the initial interview patients were instructed to keep a diary. They were told to record each attack of airway obstruction, it's severity, and the dosage of the drugs they consumed. They continued to take prescribed bronchodilator drugs throughout the study. When they noticed an improvement or deteriotatation in their asthma they were permitted to change their dosage as required, and they recorded this in their diaries. Any change in the brand of drug, however, was decided by the doctor. At each of the follow up visits information from patients diaries and from clinical examinations was recorded. The mean weekly number of attacks for each period of follow-up was calculated severity of attacks was graded: 1=mild, but did not disturb sleep or daily routine; 2=moderate, disturbed sleep and daily routine and was relieved by oral drugs; 3=severe, required injection or admission to hospital. We obtained a score for drug treatment by calculating the mean number of bronchodilator tablets and injections taken each week for each period of follow up. None of the patients used inhalers. Peak expiratory flow rate was obtained by recording the best of three attempts on a mini Wright Peak flow meter.

RESULT

Table II shows the results of the study. Comparison of the two groups using Student's t-test showed a highly significant improvement in the number of attacks per week and drug treatment scores in the patients who practiced yoga. Because of large fluctuations in the mean, the standard deviation was similar for the mean for many of the values in table II. A non-parametric median test with a X^2 evaluation was therefore used to determine significance. Table iii shows the results and confirms that there were highly significant differences in peak flow rate as shown by the non-parametric test

Table II : Results of Student's paired test for mean difference between values before and after 54 months follow up for the 2 groups of 53 patients.

Variable	Group	Mean(SD) Initial Value.		Mean (SD) Final Value. Initial & Final		Significance of difference between Value.	Difference between Groups.
No. of attacks of asthma/ Week	Control	2.9	(3.01)	2.1	2.7	2.578**	
	Yoga	3.55	(2.98)	0.83	2.49	4.827**	2.825**
Severity score.	Control	1.6	(0.75)	1.05	0.85	4.006**	
	Yoga	1.47	(0.66)	0.75	0.8	5.016**	0.369(NS)
Drug treatment Score	Control	6.22	(3.18)	7.9	9.9	0.556(NS)	
	Yoga	10.26	(13.16)	2.04	4.09	4.964**	3.152**
Peak flow rate	Control	264.2	(117.2)	290.8	12.2	4.065**	
	Yoga	260.2	(76.2)	362.6	107.6	7.386**	1.815*

**P > 0.03 , ** P< 0.005.*

Peak flow rate measured in only 50 control and 44 patients in yoga group.

Table III Meadian test with X^2 evaluation of - difference between yoga and control groups before and after 54 month follow up.

Variable	X^2 Value Initial	Final
No. of attacks of asthma/ week	0. 06	5. 665*
Severity Score	0. 149	1. 89*
Drug Treatment Score	0. 1004	4. 56*
Peak flow rate	0. 0448	3. 87*

**p < 0.01*

Table IV : Variations in mean Scores for drug treatments and peak flow rate after each Six Month Period of follow up

	Stopped	Reduced	No. Change	Increased	
Control Group	23	9	7	14	$\}\ X^2 = 4.48^*$
Yoga Group	30	12	3	8	

*$p < 0.01$

Table IV shows the number of patients who changed their drug treatment in both groups Yoga had a significantly beneficial effect (p<0.01).

Table V shows the distribution of the initial and final mean values for drug treatment score and peak flow rate in the yoga and control groups over the months of follow up. In the yoga group the drug treatment score fell considerably and the peak flow rate increased (to a greater extent than that in the control).

Table V : Variations in mean Scores for drug treatment and peak flow rate after each Six Month Period of follow up.

		Periods of follow up							
	Groups	1Mon	6 Mons	12 Mons	18 Mons	24 Mons	30 Mons	36 Mons	54 Mons
Mean drug Treatment Score	Control	10.26	2.875	10.66	0.666	1.875	14.5	7.0	9.0
	Yoga	6.22	0.428	5.444	7.0	1.166	1.20	2.0	3.11
Peak flow rate (L/min)	Control	264.2	291.25	174.5	190	222.5	236.66	308.75	320.62
	Yoga	290.1	371.64	339.375	236	372.5	370.0	110.0	348.78

DISCUSSION

As care was taken to match the two groups for age and sex and type, severity, and duration of asthma, we can attribute the improvement seen in the variables measured in the 53 patients in the Yoga group to the regular practice of yoga. The considerable reduction in their drug treatment score in contrast with a non-significant increase in intake of drugs in the control group strengthens this view, as do the significant differences between the groups in the number of attacks per week and peak flow rate.

McFadden clearly showed that the responsiveness of airways is noticeably increased in patients with asthma, who develop bronchoconstriction in response to smaller quantities of physical, chemical, and pharmacological stimuli than healthy subjects. A complex interplay of several factors namely, an inherent responsiveness of the smooth muscle to stimuli, an abnormality in autonomic nervous control, and a breakdown in airway defences may promote bronchial hyper-reactivity. Thus reducing the responsiveness of the tracheobronchial tree could benefit these patients considerably.

Abundant objective data now exist indicating that psychological factors can interact with the asthmatic diathesis to worsen or improve the course of the disease. The mechanisms of these interactions are complex and not well understood, but psychological factors may affect about half of all patients. Modification of vagal efferent activity seems to affect the calibre of airways. It has been shown that suggestion can actually decrease or increase the effects of pharmacological stimuli on the airway. The role of the psychic factor in inducing or prolonging attacks in acute exacerbations may vary from patient to patient and in individual patients from episode to episode.

Goyeche et al claimed that the psychosomatic imbalance is present in many, if not all patients with asthma[1]. Suppressed emotion, anxiety, dependence, and extreme self consciousness may all be accompanied by generalised and localised muscle tension, including that of the voluntary respiratory musculature. This increased muscle tension may be a precipitating or concomitant factor that perpetuates and aggravates the asthmatic syndrome.

Yoga seems to stabilise and reduce the excitability of the nervous system. Transcendental meditation (a traditional yogic meditation technique) and Savasana have been clearly shown to be associated with reduced metabolic rate[2]. Crisan showed a significant reduction in the level of anxiety after the practice of Pranayama, as evidenced by increased skin resistance and a reduction in pulse rate, urinary catecholamine concentration, Urinary cholinesterase activity, and anxiety scores[12]. Several workers have found an increase in alpha synchrony in electroencephalograms taken during transcendental meditation, which points to its stabilising effect on the nervous system. Yoga clearly relaxes the muscles and this deep physical and mental relaxation associated with the physiological changes seen in our patients after daily yoga seems to have a stabilising effect on bronchial reactivity, thus making the vagal efferent less excitable.

In conclusion, the reduction in psychological hyper-reactivity and emotional instability achieved by yoga can reduce efferent vagal reactivity, which has been recognised as the mediator of the psychosomatic factor in asthma.

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Journal of Asthma, 23(3), 129-137 (1986)

AN INTEGRATED APPROACH OF YOGA THERAPY FOR BRONCHIAL ASTHMA: A 3 -54-MONTH PROSPECTIVE STUDY

Nagendra H.R., Nagarathna R. *

Vivekananda Kendra Yoga Research Foundation, Bangalore, India.

Abstract: After an initial integrated yoga training program of 2 to 4 weeks, 570 bronchial asthmatics were followed up for 3 to 54 months. The training consisted of yoga practices-Yogasanas, Pranayama, meditation, and kriyas-and theory of yoga. Results show highly significant improvement in most of the specific parameters. The regular practitioners showed the greatest improvement. Peak expiratory flow rate (PFR) values showed significant movement of patients toward normalcy after yoga, and 72, 69, and 66% of the patients have stopped or reduced parenteral, oral, and cortisone medication, respectively.

These results establish the long-term efficacy of the integrated approach of yoga therapy in the management of bronchial asthma.

INTRODUCTION

Goyeche et al., (1) have summarized the available literature on the use of yogic practices in the management of patients with bronchial asthma. Reviewing the work done in this field for about 50 years at various yoga centres of India and Japan, they have been able to show clearly the beneficial effects of yoga in bronchial asthma. Other works (2-4) delineate the rationale and principles of yoga therapy in general, while the investigations of Honsberger and Wilson (5), Erskine and Schonnell (6), and Mortens et al. (7) report the effects on bronchial asthma of meditation, relaxation therapy, and continued physical exercise. An integrated approach of yoga therapy developed from the Upanishads (the original scriptures of India) and yoga texts has been presented by Nagendra (8). We had earlier reported (9-12) the usefulness of yoga treatment in rehabilitation of bronchial asthmatics in smaller groups of patients.

However, most of the works in this field lack long-term follow-up programs. Our recent communication (13) describes a matched control study in which the 54 - month follow-up of 53 patients clearly established the effectiveness of an integrated approach of yoga therapy for bronchial asthma. This present work is the report of a parallel study on 570 patients followed up for 3 to 54 months.

PATIENTS AND METHODS

Among the patients followed up in our continuing research program, we present here the results of 570 cases selected at random. These patients satisfied the clinical criteria of Crofton and Douglas (14) and Shivpuri (15) for diagnosis of bronchial asthma.

After the initial diagnosis and recording of data on these patients, they underwent a yoga training program for either 2 weeks (2 ½ hr. daily) or 4 weeks (1 ¼ hr. daily). The training program consisted of the following:

1. Breathing exercises (5 min): Five types of simple, rhythmic, slow, and comfortable breathing practices associated with simple hand and body movements.

2. Sithilikarana Vyayama and Suryanamaskar (5 min): Yoga practices to loosen the joints.

3. Yogasanas:

   (1) General Yogasanas (20 min): Simple easy physical postures in standing, sitting, prone, and supine positions performed with smooth, comfortable bending movements along with specific slow-breathing procedures. Maintenance with ease and relaxation in the final posture characterized the asana practices.

   (2) Savasana (10 min): Deep relaxation practice to consciously relax the muscles regionally, followed by conscious slowing of breath and calming of the mind.

4. Pranayama (10 min): Three types of special breathing techniques. (Nadisuddhi, Sitkari, and Bhramari) performed with easy, comfortable, and slow deep breathing without voluntary breath holding.

5. Meditation and devotional session (15 min): Slow mental chanting of the syllable "OM" leading to slower and slower mental activity. The devotional session was meant to harness the emotions, resulting in a feeling of freedom.

6. Kriyas (once a week): Traditional voluntary nose and stomach-wash techniques (Neti and Vaman-dhouti) followed by Savasana.

7. Lectures and discussions: These were based on yoga philosophy and yoga therapy. Embedded in these practices are the key features of yoga operating from different levels:

   1. Deep relaxation of different groups of muscles.
   2. Slowing of breath.
   3. Calming of the mind.
   4. Emotional equipoise.
   5. A life-style of internal awareness and bliss in action.

These points were emphasized in the theory classes. The patients were given a feel for these aspects in the practical sessions. For example, we asked them to maintain smiling, tension-free face throughout the sessions. Such instructions help them out of their usual habit of getting tense and feeling stress.

After completing the course, the patients were asked to continue the sessions regularly. Some of them opted to continue at home by themselves and some attended the yoga classes at our centers. Many of them attended 1 or 2-month courses subsequent to their initial training program. But the bulk of the patients chose to continue for an hour daily at home after their first course. Some did the exercises for a half hour in the morning and a half hour in the evening if they could not set aside a full hour at one time. Kriyas were practiced on weekends. The patients learned to use breathing exercises while seated to overcome mild to moderate attacks of bronchospasm, which gave them enormous confidence about the reversibility of their condition. In case of children below 10 years old, the regularity and accuracy of practice was ensured by giving the same yoga training to one of the parents, who supervised practice at home. Elderly persons were asked to omit from the asanas prescribed three difficult practices, Sarvangasana, Halasana, and Cakrasana. Persons who had a previous history of chronic-ear discharge or surgery of the ear were asked to omit Jalaneti Kriya. Persons who had marked nasal blockage practiced Jalaneti Kriya daily at the time when their symptoms were worst.

Patients were given the freedom to decrease or increase the dose of bronchodilator, depending on their requirement. Those dependent on cortisone were encouraged to shift slowly to a nonsteroidal bronchodilator and then taper off. They made a note of the changes in medication in their diary which they presented during their follow-up visits. (Necessary changes in the brand of the drug required by the patient were always decided by the attending doctor.) At the end of the initial program, the participants were instructed to send us each month a completed questionnaire; their responses provided information about the state of their health (see Appendix). They were also asked to visit one of our outpatient clinics for periodic checkups and advice. In addition, monthly meetings of these patients were organized in different areas of the city.

The patients were also brought together at yearly follow-up camps of 1-3 weeks. The pattern of courses in these camps resembled that of the initial training program. The exercises learned during the initial training program were reviewed, with any necessary advice and correction in technique given. Except for the first refresher course in 1980, all other follow-up courses were nonresidential. All necessary information and test results were recorded during the camp sessions, and participants were informed about the developments of the research work and results in a monthly newsletter. The newsletter also served the purpose of announcing meetings, camps, etc., and allaying any doubts patients may have expressed.

Apart from the above, data collection was undertaken once a year. The patients were asked to report to our outpatient clinics during hours specifically assigned to them by the doctor in charge. Usually the patients were sent three reminder letters over 2 months during the monsoon period, which has been found to be the worst period for asthmatics in Bangalore.

The annual follow-up drive also consisted of house visits to those patients who did not respond to the letters. Members of our trained paramedical staff recorded the necessary information and asked the patients to visit our clinics and provide more detailed information about their health.

PATIENTS AND PARAMETERS

The details of the patients are furnished in Table 1.

The follow-up duration varied from 3 to 54 months. The first group entered the study in June 1979 and the last group in December 1983.

Table 1. Details of Patients

Total No. of patients	570
No. of men	408
Age	7-78 yrs.
Duration of asthma	23.22 ± 19.44 yrs.
Duration of follow-up	3-54 months

The various parameters, listed below, were recorded before and during each of the followup visits.

Specific Parameters

1. Number of attacks per week: The average number of attacks per week over the period of study was recorded at each of the follow-up meetings. In the initial record, for seasonal asthmatics, the average number of attacks per week for the worst months of the previous year was noted. In perennial cases, the average number of attacks per week for the previous year was noted.
2. Duration of attacks: Average duration of an attack was noted as per the subject's statement and crosschecked with his diary.
3. Number of months: Number of months in the year during which the person suffered from asthma.
4. Nasal allergy: The three main symptoms of allergic rhinitis, i.e., sneezing, rhinorrhea, and nasal blockage, were scored 1 each.
5. Severity of attacks: The three grades of severity were:
   (1) Mild: Wheezing that did not disturb the sleep at night or the daily routine.
   (2) Moderate: Disturbed sleep and the daily routine, required medication orally or parenterally. Fewer than 12 injections were used per year.
   (3) Severe: Great distress, calling for an injection and/ or hospitalization. Required 12 or more injections per year.
6. Medication per week: The average number of bronchodilator tablets per week consumed by the patient during the period of follow-up was recorded. If a person was taking Ayurveda medicines, the same was calculated in terms of average number of tablets per week. In the case of powders one packet was calculated as one tablet.
7. Cortisone: The average number of tablets of cortisone per year was counted separately.
8. Injections: Total number of injections per year was noted as a different parameter.

   Whenever it was noted that a patient had changed over to a different system of medicine during the follow-up period, that case was discarded from the study from that date.
9. Peak expiratory flow rate: PFR (in liters/minute) was obtained by noting the best of the three exhalations on a miniature Wright's PFR meter. As this measurement is considered a sensitive indicator of the presence or absence of airway obstruction comparable to the FEV_1/FVC ratios by several workers, PFR values obtained before and after the yoga training period and periodically during the long-term follow-up period are used in this study as a specific parameter in the evaluation of the response.
10. Wheezing, 11. Ronchi and 12. Crepitations: On careful ausculation of the chest their presence or absence was recorded as plus or minus.

Triggering Factors

The various triggering factors as observed by the patient were recorded at each of the visits. No grading has been used for these parameters. The presence or absence of sensitivity to these agents was recorded as plus or minus.

13. Dust.
14. Smoke, vapors, strong scents, incense sticks, etc.

15. Emotion: Anxiety, tension, unusual distress, etc.
16. Weather: Influence of weather conditions.
17. Food: Particular items of food, such as bananas, eggs, buttermilk, or ice cream, that the patients had noticed as a triggering factor.
18. Exercise: Running or heavy work inducing wheezing.

The first 12 parameters, which can be considered direct indicators of a person's asthmatic state, we call specific parameters. They include both subjective and objective ones. The second category (parameters 13 to 18) comprises the triggering factors. Other parameters that are indicators of the general effects of yoga are called general parameters.

General Parameters

19. Cough: The average duration of cough per day was graded into three degrees.
    (1) Less than 5 min per day.
    (2) 5 to 10 min per day.
    (3) More than 10 min per day.
20. Sputum: Quantity of sputum was noted. The three grades are:
    (1) Less than ½ oz per day.
    (2) ½ to 2 oz per day.
    (3) Greater than 2 oz per day.
21. Fever: Number of attacks in a year of the febrile periods associated with respiratory infection.
22. Sore throat: Number of attacks of acute pharyngitis or tonsillitis in a year.
23. Breathlessness on exertion:
    (1) Breathless only on walking uphill, could walk comfortably on level ground.
    (2) Breathless while walking on level ground.
    (3) Breathless at rest.
24. Other symptoms: Patients with a history of any other associated major respiratory ailments like emphysema, chronic obstructive airway disease, tuberculosis, etc., were not included in the study. Patients with any other chronic illnesses, such as hypertension, IHD, or diabeteswere also excluded from the study. Asthma associated minor symptoms like headaches, low back pain, and general weakness were listed under this parameter. Each of the symptoms received a score of 1 for purposes of analysis under this group.
25. Pulse rate (PR): Pulse rate counted for 1 min.
26. Respiratory rate (RR): Number of inspirations in 1 min.

27-28. Blood pressure (BP): Using a sphygmomanometer, the systolic (27) and diastolic (28) BP were recorded by the ausculatory method.

29. Chest expansion: Chest expansion in centimeters was recorded by noting the difference in chest measurement between complete exhalation and deep inhalation.
30. Breath-holding time (BHT): After a standardizing deep inhalation followed by complete exhalation, the patient was asked to inhale deeply and hold the breath as long as he could while being timed.

Classification of yoga groups: During the follow-up visits, participants were encouraged to give an honest report of the regularity of their yoga practice and were grouped into three categories accordingly.

1. Regular: Those who practiced yoga for 1 hr daily for more than 16 days in a month on an average were classified as regular practitioners.
2. Irregular: This group of patients continued practicing yoga for about 1 hr a day but irregularly. Empirically we placed a patient in the irregular group if he had practiced yoga for fewer than 15 days per month on an average.
3. Discontinued: This category included all those who had discontinued practicing yoga on their own, after varying periods of regular practice after the initial training.

RESULTS

The data obtained on all these 30 parameters for the whole group of 570 patients followed up for 3 to 54 months are presented in Table 2. For all the continuous parameters (1 to 12 and 19 to 30) the standard Student's paired t test for the mean of the differences is used to evaluate the changes. For the parameters 13 to 18, the two-tailed standard test for dichotomous variables (12) has been adopted.

Except for the number of injections per year and crepitations, all other specific parameters (1 to 18) show highly significant improvements, as can be seen in Table 2. The general parameters (19 to 30) indicated the effects of yoga on the general health of those persons. Table 2 shows significant improvements in most of the variables except in the cardiac parameters, including PR and BP.

Tables 3a, b, and c depict the effect of regular, irregular, and discontinued yoga practice on the various parameters under study. Comparing the results on these three tables, we notice that results are highly significant in those who have been regular with their yoga practices. The t values are highest for all specific parameters in Table 3a. The t values for reduction in injections/ year and crepitations have reached significant levels in this category, as opposed to in the other two groups and the entire group as a whole. The pattern for the general parameters is similar to that for the whole group.

Table 3b illustrates that those who practiced yoga irregularly show the least improvement. Although the changes are not significant for many of the parameters, the most important ones- reduction in attacks/ week, duration, severity, and medication, and the increase in PFR-do show significantly good t values.

It is interesting to note that those who had discontinued yoga after practising regularly for varying durations following the initial training experienced much better results than those who were irregular practitioners (Table 3c). Here the results are very much similar to those for patients who continued to practice regularly. Except for the two variables, i.e., crepitations and injections, most of the specific parameters show highly significant improvement. The general parameters show the same pattern as for the whole group.

Table 2 Result for the complete group

Parameters	n[a]	$\overline{X}b$[b]	S.D.b[c]	$\overline{X}a$[b]	S.D.a[c]	t
1. Attacks /wk	475	4.5	44.35	1.91	3.25	-10.59
2. Duration	463	3.2	19.44	6.29	0.496	-12.46
3. No. of mos.	444	8.2	5.04	4.23	4.49	-13.43
4. Nasal allergy	502	1.8	0.99	0.88	0.96	-15.71
5. Severity	563	1.53	0.88	1.08	0.90	-09.66
6. Medication/wk	529	12.15	21.53	6.34	9.67	-10.08
7. Cortisone	108	174.2	227.7	86.75	188.6	-03.41
8. Injections	166	6.4	12.56	3.92	12.11	-01.73
9. PFR	570	265.8	122.36	319.7	131.85	11.45
10. Wheezing	49	0.89	0.30	0.22	0.18	-07.16
11. Ronchi	99	0.83	0.49	0.4	0.17	-06.0
12. Crepitations	35	0.68	0.47	0.4	0.47	0.496
Triggering factors[e]	n- No Change			n- Aggravated	n-Improved	t[a]
	+ to +	- to -		- to +	+ to -	
13. Dust	276	110		32	142	6.46
14. Smoke	178	201		37	128	5.18
15. Emotion	65	348		37	99	4.74
16. Weather	264	107		43	154	6.89
17. Food	162	214		44	150	6.83
18. Exercise	30	424		32	61	2.69
General parameters[f]						
19. Cough	453	1.30	0.72	0.64	0.72	-14.05
20. Sputum	459	1.22	0.77	0.716	0.72	-10.2
21. Fever/ yr	101	1.75	2.34	1.16	2.93	-1.92
22. Sore throats/ yr	92	1.11	1.56	1.34	1.55	0.93
23. Breathlessness on exertion	275	0.91	0.76	0.67	0.61	-3.05
24. Other symptoms	163	2.43	1.82	1.46	1.87	-4.68
25. Pulse rate/min	501	78.66	31.66	79.81	31.04	0.58
26. Respiratory rate/min	4302	2.05	6.73	21.5	6.59	-12.82
27. Blood pressure(sys.)	5141	18.6	49.4	119.6	34.05	0.40
28. Blood pressure(dias.)	514	77.9	27.95	75.82	11.0	6.23
29. Chest expansion	529	5.57	5.75	6.90	4.32	6.23
30. Breath-holding time	470	23.67	13.23	27.15	13.88	5.98

[a] *n= Number of patients,* [b] *Xb, Xa = Mean before and after yoga, respectively.*

[c] *S.D.b,* [c] *S.D.a = Standard deviation for the corresponding means. $t > 2.78$, $p < 0.005$; t of 1.96 = $p < 0.05$.,*

[d] *Specific parameters = highly significant improvement in all except injections and crepitations.*

[e] *General = Significant improvement in all except sore throats/ years, PR, and BP.*

[g] *Significant if greater than 4.18*

Table 3a Result for the complete group

Parameters	n	$\overline{X}b$	S.D.b	$\overline{X}a$	S.D.a	t^a
Specific parameters						
1. Attacks/wk	232	4.92	5.48	1.43	2.52	-8.67
2. Duration	223	11.91	16.95	5.53	10.64	-4.90
3. No. of mos.	228	8.51	6.19	3.84	4.51	-9.63
4. Nasal allergy	249	1.76	0.93	0.80	0.89	-12.87
5. Severity	277	1.53	0.92	1.05	0.90	- 6.91
6. Medication/wk	268	12.44	11.55	6.40	10.86	-7.07
7. Cortisone	44	193.52	203.44	55.16	123.38	-3.97
8. Injections	85	5.49	10.58	1.98	4.27	-2.72
9. PFR	289	266.03	122.15	328.92	133.29	9.59
10. Wheezing	20	1.00	0.00	0.10	0.31	-13.08
11. Ronchi	42	0.90	0.30	0.26	0.45	-6.35
12. Crepitations	16	0.75	0.45	0.25	0.45	2.24
Triggering factors	n- No Change			n- Aggravated	n-Improved	t^b
	+ to +	- to -		- to +	+ to -	
13. Dust	113	56		16	86	6.93
14. Smoke	78	100		18	72	5.69
15. Emotion	32	163		18	51	3.97
16. Weather	117	53		15	89	7.26
17. Food	69	111		18	79	6.20
18. Exercise	13	198		15	38	3.16
General parameters						
19. Cough	226	1.30	0.68	0.55	0.69	-12.64
20. Sputum	231	1.29	0.80	0.65	0.69	-09.48
21. Fever/ yr	50	2.04	2.78	1.24	3.66	-1.61
22. Sore throats/ yr	43	1.14	1.47	1.23	1.41	0.26
23. Breathlessness on exertion	140	0.90	0.66	0.65	0.69	-2.74
24. Other symptoms	87	2.62	1.90	1.16	1.76	-4.85
25. Pulse rate/min	270	80.44	39.38	70.88	11.43	-0.62
26. Respiratory rate/min	245	22.34	7.24	20.98	3.61	-2.95
27. Blood pressure(sys.)	262	118.55	56.33	120.48	45.88	0.44
28. Blood pressure(dias.)	262	79.04	37.02	74.00	11.23	-2.14
29. Chest expansion	274	5.49	5.50	6.83	4.90	3.66
30. Breath-holding time	256	23.70	13.23	28.96	14.96	6.61

[a] *$t > 2.78$ is p less than 0.005 and $t = 1.96$ corresponds to $p = 0.05$ Highly significant improvement on all parameters except 21, 22, 25, and 27.*

[b] *Significant if > 4.18.*

Table 3b Result for the complete group

Parameters	n	Xb	S.D.b	Xa	S.D.a	t^a
Specific parameters						
1. Attacks/wk	49	4.24	3.21	2.24	3.15	-3.44
2. Duration	42	12.48	22.75	8.45	16.22	-0.96
3. No. of mos.	40	7.73	3.50	6.18	4.52	-2.51
4. Nasal allergy	48	1.27	1.09	0.98	0.89	-1.49
5. Severity	53	1.58	0.82	1.02	0.82	- 3.94
6. Medication/wk	268	12.44	11.55	6.40	10.86	-7.07
7. Cortisone	[only 9 patients]					
8. Injections	15	4.07	5.01	9.60	24.52	0.83
9. PFR	52	257.88	116.05	296.83	134.07	2.69
10. Wheezing	[only 3 patients]					
11. Ronchi	[only 6 patients]					
12. Crepitations	[only 3 patients]					

Triggering factors	n- No Change		n- Aggravated	n-Improved	t
	+ to +	- to -	- to +	+ to -	
13. Dust	31	6	5	8	0.83
14. Smoke	17	14	9	9	0
15. Emotion	8	34	5	3	-0.71
16. Weather	30	4	7	11	0.94
17. Food	21	13	6	13	1.16
18. Exercise	0	40	4	4	0

General parameters						
19. Cough	43	1.30	0.77	0.74	0.85	-2.86
20. Sputum	38	1.03	0.68	0.84	0.68	-1.10
21. Fever/ yr	12	0.67	0.49	0.67	0.65	0.00
22. Sore throats/ yr	[only 9 patients]					
23. Breathlessness on exertion	33	0.73	0.76	0.85	0.36	0.75
24. Other symptoms	22	2.05	1.81	2.18	1.97	0.24
25. Pulse rate/min	41	74.39	23.27	92.39	101.37	1.12
26. Respiratory rate/min	35	20.11	7.45	21.97	10.67	0.95
27. Blood pressure(sys.)	49	115.98	26.69	121.04	16.55	1.39
28. Blood pressure(dias.)	49	76.06	16.63	74.57	12.51	-0.62
29. Chest expansion	45	6.56	8.61	6.62	2.25	0.55
30. Breath-holding time	38	26.71	16.49	26.39	11.99	-0.14

[a] *Significant improvement in a few important parameters only, i.e., 1, 3, 5, 6, 9, and 19.*

Table 3c Result for the complete group

Parameters	n	Xb	S.Db	Xa	S.Da	t[a]
Specific parameters						
1. Attacks/wk	188	4.08	2.77	2.42	3.94	- 5.19
2. Duration	194	13.78	20.65	6.30	12.64	- 4.47
3. No. of mos.	172	8.02	3.42	4.27	4.36	- 9.84
4. Nasal allergy	202	1.96	0.98	0.95	1.04	10.09
5. Severity	229	1.52	0.84	1.13	0.94	- 5.46
6. Medication/wk	207	11.68	11.80	6.29	8.02	- 6.14
7. Cortisone	54	179.70	256.84	93.72	204.83	- 2.40
8. Injections	64	8.28	15.87	5.23	14.55	- 1.06
9. PFR	222	270.18	124.32	315.90	129.30	5.89
10. Wheezing	26	0.85	0.37	0.31	0.47	- 3.61
11. Ronchi	50	0.80	0.40	0.40	0.49	- 3.50
12. Crepitations	16	0.63	0.50	0.56	0.51	- 0.22
Triggering factors	n- No Change		n- Aggravated		n-Improved	t
	+ to +	- to -	- to +		+ to -	
13. Dust	128	47	11		47	4.73
14. Smoke	82	85	17		46	3.65
15. Emotion	23	148	14		45	4.04
16. Weather	113	48	21		54	3.81
17. Food	69	88	20		57	4.22
18. Exercise	16	182	13		18	0.90
General parameters						
19. Cough	181	1.31	0.77	0.73	0.84	-7.48
20. Sputum	186	1.19	0.74	0.77	0.77	-5.14
21. Fever/ yr	38	1.74	2.00	1.18	2.32	-1.12
22. Sore throats/ yr	39	1.28	1.78	1.36	1.75	0.19
23. Breathlessness on exertion	98	0.97	0.89	0.63	0.54	-2.84
24. Other symptoms	53	2.30	1.71	1.62	1.90	-2.22
25. Pulse rate/min	186	77.14	17.97	78.12	11.98	0.64
26. Respiratory rate/min	145	21.90	5.54	22.12	8.82	0.25
27. Blood pressure(sys.)	199	119.53	44.34	118.35	12.50	-0.37
28. Blood pressure(dias.)	199	77.04	12.02	77.33	10.12	-0.34
29. Chest expansion	205	5.51	5.44	7.11	3.88	4.81
30. Breath-holding time	172	23.10	12.61	24.97	12.14	-2.07

[a] *Highly significant improvements in most of the parameters similar to those in the regular yoga practice group.*

Medication Analysis

Table 4a gives the percentage of patients in the whole group who stopped, decreased, increased, or did not change their needed dosage of drugs during the period of follow-up; 69, 72, and 66% of patients had stopped or reduced tablets, injections, and cortisone, respectively.

Table 4b shows the results of the medication analysis using Mc Nemar's test for repeated observations. A chi-squared value above 10 is considered highly significant on this nonparametric test. Here we find that participants in all three groups regular, irregular, and discontinued-have significantly reduced their intake of oral medication.

In the regular group, even the need for cortisone and parenteral bronchodilator decreased. In the irregular group, the reduction in cortisone and injections is not significant, but in the discontinued group, the cortisone dosages have been reduced significantly. These results reinforce those presented in Tables 3a, b, and c using the t-test.

Thus, we find that this test clearly shows that the long-term requirement of oral medication decreases with either regular, irregular, or discontinued yoga practice, whereas to reduce the acuteness of the attacks that require parenteral medication one must be regular with his yoga practice.

PFR Analysis

We have observed highly significant improvements in the PFR values in all patients whether they were in the regular, irregular, or discontinued yoga group, as indicated in Table 3.

Table 5a shows the distribution of patients in different categories of f values for PFR. The f values refer to the ratio of the PFR observed to PFR predicted. The predicted PFR was obtained from Kamat's South Indian norms of respiratory function tests (16). The value f = 1 indicates a normal airway; the less the f value the greater the airway obstruction. We notice that more and more patients are moving toward normalcy after yoga, as demonstrated by increasing numbers in f categories of 0.75 and above and decreasing numbers in f categories less than 0.75. This trend is depicted clearly in Figure 1.

Table 4a. Medication Analysis for the Entire Group[a]

	Total n	Stopped %	Decrease %	Unchanged %	Increased %
Tablets	529	42.0	27.2	14.5	16.3
Injections	108	62.1	10.2	5.5	22.2
Cortisone	166	53.5	12.0	2.0	32.5

[a]69.2, 72.3, and 65.5% have stopped or reduced oral, parenteral, or cortisone medication, respectively.

It can be seen from Table 5a that initially 191 patients had f values greater than 0.75 (Nf >0.75) while after the yoga practice 293 patients reached 75% of their predicted normal PFR value. This amounts to an increase from 27 to 49% in the ratio

$$\frac{Nf > 0.75}{Nf < 0.75}$$

before and after the yoga practice, respectively.

Table 4b. Medication Analysis and Regular of Yoga Practice[a]

	[b]UPPER	[c]LOWER	TOTAL	[d]CHI - SQUARED VALUE
Tablets				
Regular	182	38	220	94.25
Irregular	32	9	41	12.90
Discontinued	114	26	140	55.31
Injectimons				
Regular	49	15	64	18.06
Irregular	4	6	10	0.40
Discontinued	35	16	51	7.07
Cortisone				
Regular	34	5	39	21.56
Irregular	3	4	7	0.14
Discontinued	32	8	40	14.40

[a]Mc Number's test for repeated observations is used. [b] Upper = Sum of the numbers above the diagonal. [c]Lower = Sum of the number below the diagonal. [d] Chi-squared value greater than 10 is significant.

Table 5a. Distribution of Patients in f - values for PFR[a]

	< 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 0.9	0.9 -1	1
Total						
Before	94	246	356	139	32	20
After	82	187	325	157	74	62
Regular						
Before	45	132	188	62	22	12
After	36	102	154	82	43	34
Irregular						
Before	7	26	31	15	2	0
After	9	14	36	13	6	3
Discontinued						
Before	13	18	33	13	2	1
After	13	21	18	18	5	5

[a]

$$f = \frac{\text{PFR observed}}{\text{PFR predicted}}$$

Distribution of patients (N) in f categories before and after yoga. The trend of increasing number of patients moving towards normalcy ($f > 0.75$) after yoga is shown. Ratio of $Nf < 0.75$ to $Nf < 0.75$ before yoga = 27% and after yoga = 49%.

Table 5b shows the PER analysis done by using the f values of PFR McNemar's test for repeated observations. Here we notice that the chi -squared values have reached significant levels in the regular group. Thus, we may derive that the irregular practitioners, although showing significant improvement in PFR values, have not to a significant extent come up to their predicted normal levels.

Table 5b. PFR Analysis - f Balue[a]

	UPPER	LOWER	TOTAL	CHI - SQUARED BALU[b]
Regular	151	37	188	69.13
Irregular	19	6	25	6.76
Discontinued	103	31	134	38.69

[a]f has significantly changed in regular and discontinued group. Mc Nemar's analysis was used, [b]Chi- squared value greater than 10 is significant.

DISCUSSION

Elsewhere (9-12) we have shown the significant benefits of this integrated approach of yoga therapy as compared to drug-only treatment in 53 pairs of bronchial asthmatics matched for age, sex, and type and severity of asthma who were followed up for 54 months. The results in Tables 2, 3, and 4 showing significant improvement in a large group of 570 patients is good confirming evidence for the usefulness of yoga in the management of asthma. Those who practiced yoga regularly obviously fared best. The group who discontinued yoga after varying periods of regular yoga practice have also shown significant improvements compared to the irregular group, indicating that the benefits of regular yoga practice are not merely short-term. Such regular practices must have brought about corrections at deeper levels that resulted in more permanent benefits. Thus, the integrated approach of yoga therapy appears to bring about substantial overall improvements in asthmatics.

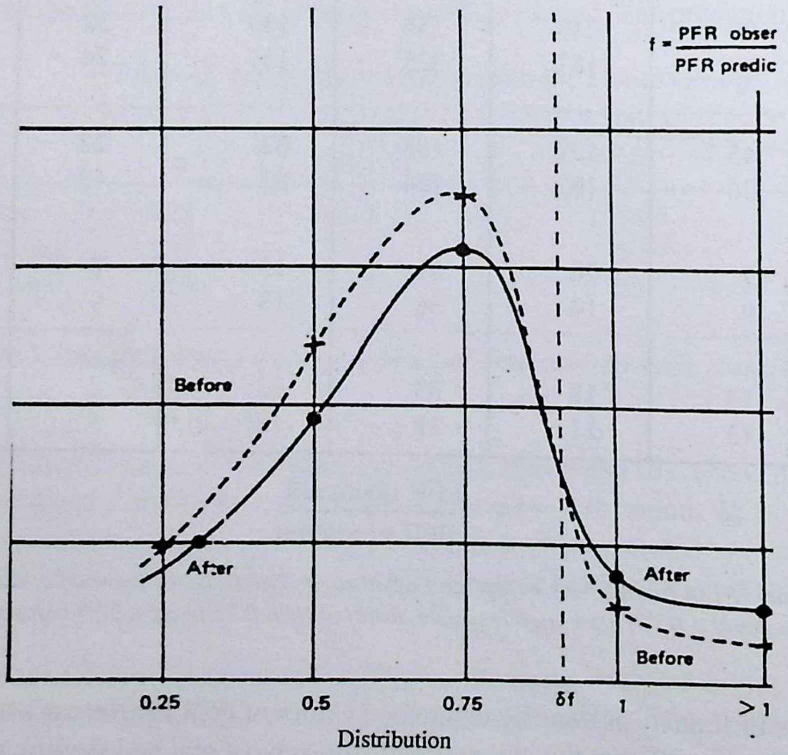

Figure 1. Number of patients before and after yoga training in terms of PFR changes. Note the shift of the cure to the right after yoga. δf (f = 0.9) is the point of crossover

Pathophysiology of bronchial asthma has been reviewed in detail by McFadden (17) and Scanlon (18). The two major factors that are recognizable today are the "extrinsic component" involving allergies to specific agents, and abnormalities of the Prostaglandin system and the autonomic nervous system (ANS), leading to markedly increased responsiveness of asthmatics' airways to smaller quantities of physical, chemical, and pharmacological stimuli. This is the "instrinsic defect." The hyperresponsiveness has been attributed to the ANS imbalance consisting of -

1. Preponderance of cyclic GMP over cyclic AMP in smooth muscles brought about by stimulation of the vagus nerve and thus the vagal receptors. This excessive vagal activity may emanate from stimulations of afferent receptors on the surface of airway smooth muscles, the latter initiating the afferent-efferent arc reflex.

2. Diminished responsiveness of bronchial beta2 receptors to the norepinephrine released from compensatory sympathetic stimulation of asthmatic stress, which in turn could be the effect of relative cortisol deficiency. This, then, could be due to increased levels of nor- epinephrine in the hypothalamus, thereby inhibiting corticotropin-releasing factor.

The integrated approach of yoga therapy appears to work at various levels in correcting the airway hyperresponsiveness.

Peripheral Level

1. Kriyas (cleansing techniques) used to desensitize the end receptors by systematic exposure to nonspecific graded irritants followed by deep relaxation may reduce the stimulation threshold of the vagal end receptors. Thus, the discharges in the afferent-efferent reflex arc may be reduced, resulting in normalizing the cyclic GMP and cyclic AMP balance in the bronchial smooth muscle.

2. Diminished responsiveness of beta$_2$ receptors: It may be worthwhile to note here that yoga practices, particularly asanas and Pranayama, have been shown to increase the urinary ketogenic steroid (19) and plasma cortisol (20) levels. This increased blood level of cortisol may help to set right the beta receptor sensitivity mentioned above.

Central Effects

The stabilization of the entire nervous system brought about by deep relaxation and rest obtained through yogasanas may also reduce the discharge frequency in the ANS.

1. Scanlon has proposed that in asthma the increase in hypothalamic norepinephrine levels may inhibit the corticotropin-releasing factor, resulting in reduced cortisol levels. Yoga has been shown to reduce the norepinephrine levels in general, as evidenced by reduced urinary VMA levels (19, 20). It may be possible that yoga also reduces norepinephrine levels in the hypothalamus to correct the imbalances. Meditation, in particular, is beneficial in this context.

2. It has also been pointed out in the etiology of asthma that the emotional stress could increase the central vagal tone, increasing the efferent vagal discharges. Yoga, with its calming effect on the mind, can reduce and release the emotional stresses. The devotional sessions that help to harness the emotional upsurges are particularly useful in eliminating the emotional stresses. Analysis and proper perspective of one's goals in life, along with the changes in attitude and life-style that are taught in our lecture sessions, contribute to improve psychological stamina.

Thus, we feel that this integrated approach of yoga practice, which is also recommended by others (1), may correct the basic pathophysiological disturbances in asthma at various levels to bring about the observed improvements.

This study is continuing with regular annual follow-up of these patients.

SUMMARY AND CONCLUSIONS

1. The effect of an integrated approach of yoga therapy on a group of 570 bronchial asthmatics was studied over 3 to 54 months.
2. The whole group was divided into three groups: regular and irregular yoga practitioners and those who discontinued.
3. The yoga training program lasted for 2 weeks (2 ½ hr daily) or 4 weeks (1 ¼ hr daily). The routine comprised breathing exercises, body loosening exercises, yogasanas, pranayama, and meditation, and a devotional session followed by a 3/4 hr lecture.
4. Subjective and objective data were collected before and after the training program using 30 parameters (18 specific and 12 general). Three groups of patients were identified, based on the regularity, irregularity, and discontinuation of yoga practice during the period of study.
5. Student's paired t test of significance for the mean of the differences has shown highly significant improvement in most of the specific parameters and in a few of the general parameters for the whole group.
6. The regular-practice group showed maximum improvements, the irregular group the least.
7. The medication analysis has shown that 69.2% of the patient's reduced or stopped oral medication; 66% have stopped or reduced cortisone, and 72.3% stopped or reduced injections.
8. The PFR analysis has shown significance in the regular and discontinued groups. The ratio $Nf \geq 0.75/Nf < 0.75$ increased from 27% before yoga to 49% after yoga, indicating movement toward normalcy.

These results clearly establish the efficacy of the integrated approach of yoga therapy in the treatment and rehabilitation of bronchial asthmatics.

ACKNOWLEDGMENTS

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DAILY PEFR STUDIES IN BRONCHIAL ASTHMATICS DURING YOGA THERAPY

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Abstract: Peak Expiratory Flow Rate (PEFR) is a good indicator for the lung function capacity. Daily PEFR recorded in 161 patients of bronchial asthma after yoga therapy of one hour daily for 15 days has shown significant trend toward s improvement. Yoga is found to be an important non pharmacological approach.

INTRODUCTION

The failure of conventional medicine to provide complete cure of psychosomatic ailment has prompted researchers to consider alternative methods of treatment. Yoga, the science for controlling the modifications of mind by relaxing the muscles, slowing down of breath and calming down of mind and thus evoking, stabilizing and expanding awareness in all our transactions is emerging as a solution. The results of our earlier studies[1,2] indicated distinct possibilities of the utility of integrated approach of yoga therapy a comprehensive programme of yogic practice beginning-with physical exercises, proceeding through breath control, to mind control techniques like meditation. In this paper are presented the results of some further short-term studies in bronchial asthmatics.

MATERIAL AND METHOD

As part of a larger project aimed to study the efficacy of yoga as a therapeutic tool in bronchial asthma, peak flow rate changes in 262 patients, were studied. The patients acted as their own controls and measurements were made before and after 15 days of integrated yoga practice.

Programme included a practical session in which the relevant practices selected from common basic set of integrated yogic practices consisting of Sithilikarana vyayama, (loosening exercises), asanas, breathing practices, kriyas (cleansing-techniques), Pranayam a, devotional session and meditation were introduced.

RESULTS AND DISCUSSION

PEFR is one of the specific parameters considered as a direct indicator of the airway potency in asthmatic and is closely used in therapeutic trials on asthma.

Table 1 shows the distribution of patient in different categories of 'f' value referred to PEFR observed/PEFRPredicted.

Predicted PEFR was obtained for each patient by referring to Kamat's norms of pulmonary function test for south Indian population. If the observed PEFR is equal to predicted PEFR, f=1, Lower f value indicates the severity of airway obstruction. Result shows an increase in the number of patients moving towards higher 'f' values clearly indicating the normalising tendency of PEFR after yoga therapy.

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Table II shows % changes in PEFR 46.5% (231) had 10-100% increase in PEFR. 't' tests showed significance at P<0.005.

Table 1 shows the distribution of patient in different categories of 'f' value referred to PEFR observed / PEFR

Table 1 showing the distrubution of 'f' values

f	n before yoga	n after yoga
< 0.25	32	26
0.5-0.25	146	117
0.75-0.5	199	173
0.9-0.75	32	106
1-0.9	29	50
> 1	9	25

Table II shows % changes in PEFR (PEFR after- PEFR - before 100) PEFR before.

Table II showing the distrubution of 'f' values

PEFR %	n	%
-20	60	12.07
-20 to -10	40	8.05
-10 to 0	57	11.47
0 to 10	109	21.93
10 to 20	57	11.47
20 to 40	70	14.08
40 to 60	43	8.65
60 - 80	27	5.43
80 to 100%	16	3.22
100 %	18	3.62

Table III Daily PEFR Value

Days	A16		A17		A18		A19	
	N	Mean	N	Mean	N	Mean	N	Mean
1	23	314.28	37	317.58	22	310.45	50	293.60
2	29	337.93	39	307.69	38	51.05	55	305.90
3	28	342.14	37	268.64	35	300.85	56	305.90
4	27	348.14	27	256.66	27	320.74	57	310.78
5	28	352.14	37	327.66	29	327.93	56	307.32
6	25	321.40	35	334.57	29	317.06	53	326.03
7	28	342.85	39	320.25	31	298.06	43	308.48
8	21	359.04	41	302.19	24	322.70	53	299.62
9	13	310.76	-	-	32	296.40	53	293.30
10	23	350.00	39	393.33	24	212.6	55	310.63
11	26	325.38	37	302.16	22	305.00	53	308.30
12	28	328.92	35	298.28	30	314.50	53	296.41
13	17	337.05	77	314.05	28	310.00	-	-
14	24	356.83	38	325.94	-	-	-	-
15	20	350.00	- -	-	-	-	-	-

On the whole increase in PEFR was highly significant. PEFR had shown high levels of significance in all grades of severity in seasonal group.

In perennial group as a whole there was no significant change in PEFR. When they wore divided Into 3 grades of severity, PEFR was not significant in grade 2.

Daily PEFR was recorded in 161 patients with bronchial asthma undergoing yoga training.

Table IV shows the PEFR values of patients daily from 1 st to 15th day.

The values depict an increasing trend from the first day to the last day of the programme. Similar trend was found in all the 4 training programmes.

Table IV

Daily PEFR Values

Days	N	Mean
1	137	307.00
2	161	251.95
3	156	303.58
4	138	309.45
5	150	324.66
6	142	325.00
7	141	316.27
8	139	313.34
9	98	296.63
10	141	315.35
11	138	309.34
12	146	306.81
13	82	317.43
14	62	336.29
15	20	350.00

It is well known that liability of airways is the problem in asthmatics. The calibre of airways have wide fluctuations from day to day and within the same day, depending on various factors Diurnal variations with (morning Dippers) is well documented. Hence any study designed to assess the effectiveness of a treatment method should include frequent PEFR recordings.

The yoga practices used are useful in improving the airways obstruction within a short period of 15 days of yoga training. The gradually increasing trend involving PEFR shows the steady improvernent in their clinical state even while the persons were being introduced into the practices.

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YOGA - CHAIR BREATHING FOR ACUTE EPISODES OF BRONCHIAL ASTHMA

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Abstract: One hundred and ten episodes of airway obstruction in 86 bronchial asthmatics were treated by a special eight stepped yoga chair breathing procedure consisting of very simple neck muscle relaxation movements and asanas with breathing exercises. Seventy percent of the episodes have been successfully relieved within a mean time of 30 mts. The patients gained great confidence and tried this technique before resorting to drugs. The reduction in panic anxiety elements, cutting the vicious circle of aggravating bronchial obstruction appear to work in relieving the acute episodes.

INTRODUCTION

The possibility of reversing the smooth muscle spasm without resorting to drugs in acute episodes of bronchial asthma has always interested several investigators. Clinical experience has often suggested that sitting quietly and/or relaxation during an acute attack is helpful and even a minor physical exertion worsens the distress. Alexander and team have shown significant increase in peak expiratory flow rate (PFR) after modified Jacobson's systematic relaxation training in asthmatics (1). Philip and colleagues have also reported effects of suggestion and relaxation in asthmatics (2). Goyeche reports that the patients during yoga therapy, learn to control the attacks (3). Shankardevaananda Saraswathi reports the use of Vaman Dhouti or Kunjal (a yogic stomach wash technique) in such episodes of asthma (4). However no systematic research study on application of yoga clinical practice has been done to our knowledge.

During and after yoga training sessions for patients of bronchial asthma, we have received similar reports of benefits. Based on such observations, a special yoga technique called yoga-chair breathing has been developed by us. The present study reports the results of a scientific study about the use of this special yogic technique during attacks in patients who were undergoing yoga training for bronchial asthma.

MATERIAL AND METHODS

The details of 86 patients with established bronchial asthma satisfying the clinical criteria of Crofton, Douglas and Shivpuri (5, 6) are presented in Table - 1.

Table 1

Age and other physical features in Asthma patients selected for study (n=86)

No. of Episodes	: 110	
Seasonal episodes	: 28	
Perinnial episode	: 24	
Mixed pattern	: 34	
Physical features	Average	Range
Age (Years)	36.8	8 - 64
Duration of Asthma (Yrs.)	15.6	0.5 - 38
Weekly number of attacks	4.9	0 - 14
Weekly drug treatment score	10.5	
Peak Flow rate (1/min)	314.8	90 - 640

The group chosen had an average of 4.9 attacks per week. An attack was defined as an episode of wheezing and dyspnoea which stopped the patient from continuing his relaxation practices and would have normally required an inhaler or tablet according to the patient's earlier experience. None of these patients could get their episodes relieved without resorting to drugs. Before taking up yoga therapy, 30% of the patients used steroids to overcome their episodes of airway obstruction. These patients were undergoing an integrated approach of yoga training in seven of our camps (of two weeks duration) spread over three years covering various seasons. (7-9). During the training programme, the patients were taught the yoga chair breathing procedure with the following eight steps :

1. Relaxation using Chair as an arm support

   a) Sit on the carpet with legs stretched. Pull the chair towards the chest with head and arms collapsed on the seat of the chair.

   b) Tense the entire body from toes to head and relax.

   c) Regional relaxation from toes to head.

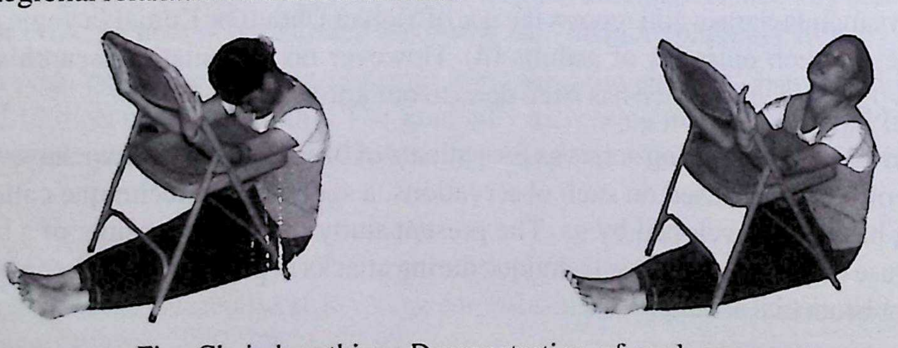

Fig. Chair breathing. Demonstration of neck movemetns

2. Neck muscle relaxation with chair support. (Fig.)

   a) Move the neck backwards and forwards slowly to relax the posterior neck muscles - five times.

   b) Inhale as deeply and as slowly as possible while bending the neck backwards, exhale while moving forwards - five times.

c) Chant 'AA' in a low tone while bending the neck forwards - five times.

3. Neck movements in Vajrasana
   - a) Move the neck forwards and backwards as before (2a), remove the chair and sit in Vajrasana - five times.
   - b) Inhale while going back, exhale while bending forward - five times
   - c) Chant 'AAA' while bending the neck forward - five times.
4. Sasankasan
   - a) Bend backward and forward from the waist while sitting in Vajrasana - five times.
   - b) Synchronise the breathing with this movement - five times.
   - c) Chant 'MMM' (Bhramari Pranayama) while bending forward - five times.
5. Tadasana (about one minute): Relax from toes to head while standing in tadasana.
6. Neck movements in Tadasana
   - a) Forward and backward - five times
   - b) With breathing - five times
   - c) With breathing and Bhramari - five times
7. Ardha Chakrasana - Pada Hastasana
   - a) Bend forward from Tadasana to Padahastasana slowly and raise unto Tadasana, and bend backward to Arda Chakrasana return to Tadasana - five times
   - b) Tadasana - Pada Hastasana - Tadasana - Ardha Chakrasana- Tadasana series with breathing- five times
   - c) Movement, breathing and Bhramari- five times
8. Savasana
   - a) Feel the natural abdominal movements building up
   - b) With breathing- five times
   - c) Movement, breathing and 'AA' sound

The whole procedure normally takes 25 minutes to 60 minutes. These patients developed a wheeze when they were learning the relaxing yoga practices. Right then, they were asked to come out of the regular yoga training, pull a nearby chair, sit on the ground and start the eight step yoga-chair-breathing procedure. The PFR reading was taken using a mini Wright's PFR Meter before and after the procedure. The total time taken in seconds for the complete procedure was noted using a stopwatch. The subjective feeling of well being and the presence of wheezing before and after were recorded in remarks column.

Those who did not improve at the end of second round of this relaxation procedure were advised to take their usual bronchodilator drug to get back to normalcy. Sometimes, the patients were in a hurry to go home and did not have enough time to complete their procedure. During the first few episodes, the patients were given suggestions to follow the procedure in the specified way. This helped them to overcome their panic and anxiety elements. The doctor incharge kept watch during the episode and administered drugs when found necessary. Later, the patients followed the procedure by themselves. The data presented relate to these latter events. They were also asked to resort to yoga chair breathing even at home and keep a diary of attacks and report their experiences. While large number of such cases on each patient was available, no more than three episodes per patient have been included in this presentation. The patients used this yoga-chair-breathing procedure whenever they felt the onset of an attack during their post -training rehabilitation phase.

RESULTS

Those patients who had symptomatic relief with no wheezing on auscultation with increasing no change in PFR were classified under improved category (I) 78 episodes. Those who felt partially improved symptomatically but had their PFR reduced or those in whom wheezing reduced were called partially improved (PI) group (21 episodes). No change (NC) group consisted of, 10 episodes.

There is a statistically significant improvement in PFR in the group as a whole and in improved groups, there is no significant change in PFR in the other categories. The average time taken is least for the I group and maximum for the NC group.

The low values of the correlation coefficient 'r' in Table 3 shows that there is no correlation between the initial PFR values and the time taken for yoga-chair-breathing in any of the groups.

Table II PER changes and Average time taken for completing yoga - chair - breathing

Group	No. of episodes	Average time (ms)	PFR: mean ± SD Initial	PFR: mean ± SD Final	Mean Diff.	't' value
I	78	29.8	112.6 (54.4)	138.2(82.7)	25.6	5.93***
PI	21	35.6	92.5 (32.3)	85.6 (26.9)	-6.9	2.58*
NC	10	41.0	96.0 (42.9)	84.0 (45.4)	-12.0	2.42 *
	1	38.0	68.0	60.0	-	-

I- Improvement , PI- Partially Improved, NC- No. Change, D- Deteriorated,
***$p< 0.001$, * $p< 0.05$.

The results of the students paired 't' test for PFR change are shown in Table 2 for all the groups.

Table III Correlation coefficient between initial PER before attack and time in minutes

Group	No. of Episodes	Initial PFR (1/min)	Time taken (min)	Correlation Coefficient (r)
I	78	112.6	29.8	0.03 (NS)
PI	21	92.5	92.5	-0.12 (NS)
NC	10	96.0	41.0	-0.41 (NS)
D	1	68.0	38.0	-
Pooled	110	106.8	32.1	-0.08 (NS)

NS - Not Significant

The Table 4 depicts the results of the analysis of variance (anova) between the groups I, P_I aqnd NC and their initial PFRs.

Table IV 'F' values showing that the differences in Initial PFR's in different groups are insignificant.

Source	Degree of Freedom	Sum of Squares (SS)	Mean SS	F
Between Groups	2	8065	4032.5	1.575*
Within Groups	0.6	271447	2560.8	
* - *Not significant*				

The low 'F' value shows that the differences are not significant. Hence the improvements or otherwise after yoga-chair-breathing does not depend on initial PFR as observed in this study of acute episodes.

DISCUSSION

Mc Fadden and team have studied the relation between the clinical and physiological manifestations in acute asthma (10). They found that even when patients were asymptomatic after an attack, their lung functions were only 40-50% of their predicted normal and when they were without signs (i.e., audible rhonchi in the chest) their mechanical lung functions were 60-70% of their predicted normal. Hence they warn that although the patients are asymptomatic after an attack this may form a base for further attacks. In our series too (I group) we have observed that although there was a significant increase in PFR, it was much below their predicted normal values. However, we noticed an overall significant reduction in mean attacks per week and medication scores during the 15 days of practice as well as in the long term follow-up in these patients (8). Hence, these results point to the fact that yoga-chair-breathing is effective as well as risk-free and could be used in all cases during attacks.

Philip has reported the differential effects of suggestion and relaxation on asthmatics in a controlled study (2). Relaxation training improved respiratory efficiency on short-term basis and also the patients tolerance to Mecholyl. The authors point out that anxiety may influence by increasing the autonomic arousal which may provoke, aggravate, or prolong the attack induced by external agents. Relaxation training helps to break the vicious cycle of anxiety and bronchospasm by deconditioning and lowering the general level of arousal of autonomic nervous system.

Yoga-chair-breathing that helps to divert the mind and move the individual into a relaxed serene Mood works similarly by warding off this panic element. Self-confidence is built up by observing the co-participants getting over their attacks (group therapy effect). The understanding of the theory of yoga helps to develop an internal awareness thus leading to a perception of the respiratory passages. The slowing down of the entire system leads to stabilisation of the nervous system, thus reducing the hyperactivity in both the afferent and efferent neurological pathways involved in the minimum dose of the bronchodilator drugs and prevent the progression to status asthmaticus (acute severe asthma).

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CLINICAL STUDY OF YOGA TECHNIQUES IN UNIVERSITY STUDENTS WITH ASTHMA: A CONTROL STUDY

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Abstract: Adult asthmatics, ranging from 19 to 52 years from an asthma and allergy clinic in a university setting volunteered to participate in the study. The 17 students were randomly divided into yoga (9 subjects) and nonyoga control (8 subjects) groups. The yoga group was taught a set of breathing and relaxation techniques including breath slowing exercises (pranayama), physical postures (yogasanas), and meditation. Yoga techniques were taught at the university health centre, three times a week for 16 weeks. All the subjects in both groups maintained daily symptom and medication diaries, collected A.M. and P.M. peak flow readings, and completed weekly questionnaires. Spirometry was performed each subject every week. Analysis of the data showed that the subjects in the yoga group reported a significant degree of relaxation, positive attitude and better yoga exercise tolerance. There was also a tendency towards lesser usage of beta adrenergic inhalers. The pulmonary function did not vary significantly between yoga & control groups. Yoga techniques seem beneficial as an adjunct to the medical management of asthma. (Allergy and asthma proc 19: 3-9, 1998)

Yoga, an ancient Indian traditional, physical and meditation posture, is becoming popular throughout the world. Yoga is the process of elevating oneself through the process of calming the mind.[1] Yoga helps in the development of the Physical[2] Mental,, Emotional, Intellectual, and Spiritual growth. [1]

Previous studies showed the efficacy of yoga therapy in various disorders such as asthma,[3-16] hypertension,[17-21] and diabetes.[1.5] Datey et al. d+emonstrated that yogic exercise (savasana) significantly reduced blood pressure in hypertensive patients.[17] Patel observed that yoga and biofeedback were effective in reducing resting blood pressure over a long period in hypertensive patients in England.[19-21] A prospective investigation by Benson et al. in the United States showed the usefulness of the regular elicitation of the relaxation response in the management of hypertensive subjects 011 drug therapy.[18] Goyeche et al. concluded that yoga therapy is very effective in patients with asthma followed over a 3-year period in a large university hospital in Japan

Significant symptomatic improvement after yoga training for 9 months in patients with chronic severe airways obstruction was observed in Australia, 8 A decade ago both short and long-term prospective studies in India showed clearly the beneficial effects of yoga in the management of bronchial asthma.

Along with other nonpharmacological adjuncts to conventional therapy for bronchial asthma,[22-26] yoga techniques have been shown to have a beneficial role in the management of asthma[3,4,7-11]. Our earlier pilot study (unpublished observation) in moderately severe outpatient

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asthmatics showed that performance of yoga techniques over a 20-week period resulted in a significant improvement of lung function, a reduction in theophylline intake, and a decrease in acute episodes.

In order to understand further the beneficial value of yoga techniques, the present study was designed to establish the efficacy of yoga in a clinically controlled situation with mild to moderate asthmatics.

PATIENTS AND METHODS

Patients

Seventeen students with documented asthma, based upon spirometry data of improvement of forced expiratory volume in first second (HEV$_1$) values by at least 20% after bronchodilator inhalation, volunteered for this study. The group consisted of 9 females and 8 males. Ages of the patients ranged from 19-52 years with a mean of 26.5 years (Table1) who attended the allergy and asthma clinic at the Harshorn Health Center of Colorado State University, Fort Collins, Colorado. The study was carefully explained to the students. Each patient signed consent to serve as a subject in the project: each patient then completed a detailed clinical questionnaire regarding his/her asthma. The Expert Panel on the Management of Asthma (National Asthma Education Program) defined asthma as a lung disease with the following characteristics: 1) airway obstruction that is reversible (but not completely so in some patients) either spontaneously or with treatment; 2) airway inflammation; and 3) increased airway responsiveness to the variety of stimuli.[27] The severity and diagnosis of asthma was based upon guidelines established by the expert panel of the National Asthma Education Program.[28] There were no smokers in either the control or yoga groups. All 17 patients completed the study and there were no dropouts.

Study Design

Students with asthma were randomly assigned (complete random design) to either the yoga group (9 subjects) or the nonyoga control group (8 subjects). During the study period, the records, of both groups were coded. Decoded data were unavailable to the principal investigations. The investigating physicians did not know which patients were undergoing the yoga intervention. The yoga group attended yoga classes offered at the health center by trained yoga teachers. The

Table 1 Vital Data

Characteristics	Yoga Group	Control Group
Number of Patients	9	9
Males	6	2
Females	3	6
Mean age (year)	28.12	25.11.
Mean height (inches)	68.8	70.11
Mean weight (lbs.)	151	169
Pulmonary function test:		
Mean FEV1 (Liters)	3.22	4.02
Mean PEFR (Liters/minute)	413	420
Mean FVC	4.31	4.99

classes were 45 minutes in duration, three times of week, for the study period of 16 weeks. The participants were given audio cassettes and written information to continue the practices at their residences. All patients, including those in the control group, were seen at the health center by one of the principal investigators at regular intervals. All of the students were given a peak flow meter (ASSESS peak flow meter, Healthscan Products, Cedar Grove, NJ) and instructed to record daily AM and PM peak flow readings throughout the study period.

Self-Report Measurement

A weekly symptom questionnaire from the asthma symptom check list devised by Kinsman et al. [29] was adapted with modification to assess changes in the symptoms and signs of the patients' asthma. A four point severity scale and five point frequency scale was included in the weekly questionnaire (Table II)

Physiological Measurements

Pulmonary function was assessed [30] objectively by measurement of FEV_1, FVC, and FMEF using a spirometer (Spirometrics, Inc., Flowmate). Weekly measurements were made and the mean of these recordings was used in the results.

Yoga Methods

1. The integrated set of yogic practices included

   A. The initial warm up activity with relaxed breathing techniques with stretching exercises. Breathing exercises (5 minutes). Five types of simple, rhythmic, slow and comfortable breathing practices associated with simple hand and body movements including hands stretch breathing, moon posture breathing, tiger breathing (Fig.1).

   B. Loosening exercises (5minutes) (Sithilikarana Vyayama) yoga practices to loosen the various joints.

2. Yogic postures:

   A. General yogasanas-physical postures (20 minutes): Simple, easy physical postures in standing, sitting, prone, and supine positions performed with smooth, comfortable bending movements along with specific slow-breathing procedures. These postures include lateral stretch, half wheel posture, forward bend, crocodile posture, cobra posture, half lotus posture, and shoulder stand (Fig. 2).

   B. Corpse posture (Savasana) (10 minutes): Deep relaxation practice to consciously relax the muscles regionally, followed by conscious slowing of breath and calming of the mind (Fig.3).

3. Breath slowing techniques (Pranayama) (10 minutes): three types of special breathing techniques (Nadisuddhi, Sitkari, and Bhramari) (Fig. 4) performed with easy, comfortable, and slow deep breathing without voluntary breath-holding.

4. Meditation and discussion session (15 minutes): slow mental chanting of the syllable "aum" leading to slower mental activity. The discussion session was designed to understand the emotional well being and positive out- look in general and to result in a feeling of freedom and relaxation.

5. Lectures and discussions were based on yoga philosophy and yoga therapy. Embedded in

these practices are the key features of yoga operating from four different levels: deep relaxation of different groups of muscles, slowing of breath and no voluntary holding of breath, calming of the mind, and emotional equipoise.

Table II

Weekly Symptom Questionnaire and Severity and Frequency Scales

Instructions: Indicate which of the following symptoms you have experienced during the past week. Check the severity and frequency of hte symptoms. Answer each item in terms of severity and frequency

Severity Score (S):		Frequency Scores (F):	
	A - No symptoms		1 - Not at all
	B - Mild symptoms		2 - Hardly at all
	C - Moderate symptoms		3 - Some of the time
	D - Severe symptoms		4 - Most of the time
	E - Very severe symptoms		5 - All of the time

	S	F		S	F
1. Panting			20. Pins and needles feeling		
2. Numbness			21. Itchy throat		
3. Mucos congestion			22. Wheezy		
4. Cranky			23. Worried about attack		
5. Irritability			24. Tingly in spots		
6. Hard to breath			25. Chest tightening		
7. Headache			26. Scared		
8. Edgy			27. Shallow breathing		
9. Frightened			28. Choking		
10. Short of breath			29. Fatigued		
11. Chest congestion			30. Chest filling up		
12. Itchy lungs			31. Tense muscles		
13. Afraid of dying			32. Tense muscles		
14. Frustrated with things			33. Worried		
14. Dizzy			34. Anxious		
16. Rapid breathing			35. Itchy skin		
17. Worn out			36. Nauseated		
18. Panicky			37. Coughing		
19. Weak			38. No. energy		
			39. Worried about self		

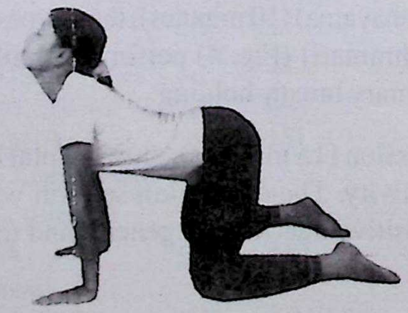

Figure 1 Tigere Breathing

Statistical Analysis

The weekly Symptom Questionnaire from control and yoga groups were analyzed using Mann-Whitney's test by the staff of the Department of Statistics, Colorado State University, Fort Collins, Colorado.

RESULTS

Medication Usage

The results showed n reduction in the use of adrenergic inhalers in the yoga group. In the control group, none of the subjects reduced the use of the inhalers; instead, two of the six control subjects showed increased usage of adrenergic inhalers (Table III). However, the difference between the two groups was not statistically significant. There were no differences between the two groups regarding the use of theophylline preparations, inhaled steroids, or antihistamines.

Self-Report Analysis

The Weekly Symptom Questionnaire included 39 different questions relating to patients' asthma, attitudes & emotions,and psychological functions. The post-weekly symptom score for severity (A-E) and frequency $^{1-5}$ were consolidated into one series of score on the basis of most frequent occurrence, over the weeks recorded. The difference between the pre and post study values were quantified individually by, giving the following weighted points to the quality of change:

Improvement in both the severity and frequency,	-	2 points
Improvement in either severity or frequency,	-	1 point
No change either severity or frequency,	-	0 points
Worsening in either severity or frequency,	-	1 point
Worsening in both severity and frequency,	-	2 Points

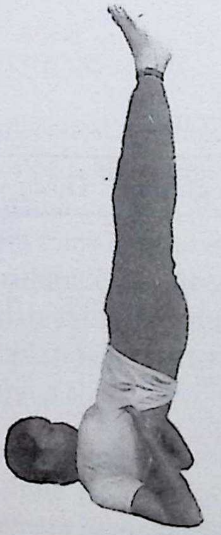

Figure 2. Shoulder Stand

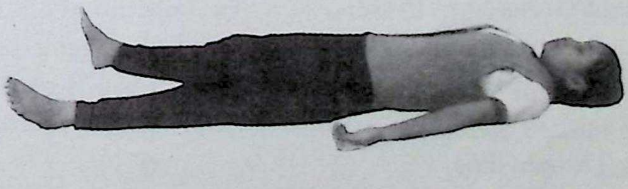

Figure 3. The Corpse Pose - Savasana

The average weight score for the yoga group (score 7.00) was much higher than for the 517, 1978. control group (score 1.75) (Table IV). However this difference was not statistically significant, based upon the Mann-Whitney test. The non- pulmonary weighted score was higher

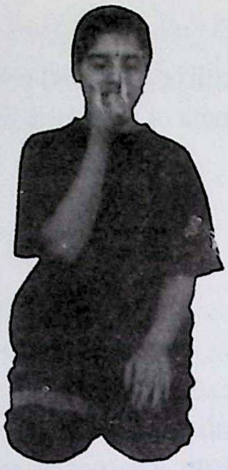

Figure 4. Alternate Nostril Breathing - Nadi Suddhi Pranayama

in the yoga group compared to the control group, but this difference was not statistically significant. There was no significant difference between the two groups regarding the pulmonary weighted score.

Respiratory Measurements

Peak expiratory flow rates were recorded daily (AM and at PM) for both the yoga and control groups throughout the study period. Analysis of the data revealed that there were no significant differences in the AM and PM peak flow rates between the groups (Table V). Table VI) shows (the mean FVC, FEV_1, and FMEF 25-75% readings recorded in both the yoga and control groups at baseline and at weeks 4 and 6. Both yoga and control groups showed no improvement in FVC, FEV_1, and FMEF 25-75% between weeks 4 and 6 of the study.

Table III

Medication Usage in Yoga and control Group

Meditations	No. of Patients	Dosage Increase	Dosage No. changes	Dosage Decreased
Yoga Group				
β – Adrenergic Inhalers	4	0	2	2
Inhaled Steroids	2	0	1	1
Theophylline	2	0	2	0
Antihistamines	3	0	3	0
Control Group				
β – Adrenergic Inhalers	6	2	4	0
Inhaled Steroids	2	1	0	1
Theophylline	2	1	1	0
Antihistamines	3	0	3	0

Table IV

Weighted Score of the Responses from Weekly Questionnaires

Groups	Total Scores	Mean	Mean Pulmonary	Mean Non - Pulmonary
Yoga	7.00 (10.16)	0.23 (0.31)	0.01 (0.72)	0.36 (0.33)
Control	1.75 (24.14)	0.06 (0.81)	0.05 (1.28)	0.07 (0.53)
Significance	NS	NS	NS	NS

Values represent means, standard deviation in parentheses, NS not Significant.

Table V

Peak Expiratory Flow Rates in Yoga and Control Groups

Groups	No. of Patients	Baseline (Liters / min)	4 Weeks (Liters / min)	6 Weeks (Liters / min)
A.M.				
Yoga	7	413 (48)	413 (48)	412 (60)
Control	7	420 (79)	424 (76)	397(48)
P.M.				
Yoga	7	406 (49)	406 (49)	406 (49)
Control	7	412 (63)	411 (65)	402(57)

Peak Expiration Flow rate expressed as Liters / Minute. Values represent means, standard deviation in parentheses.

DISCUSSION

The results showed a tendency towards a decrease in the usage of beta adrenergic inhaler during 16 weeks of regular practice of yoga. Varandani.[5] reported a 74% rate of improvement in 255 asthma patients who used yoga therapy alone (no medication except for emergencies) at Yogic Treatment-cum-Research Center in Jaipur, India. Similarly, a 76% rate of improvement was found in 114 asthma cases treated during a 1-year period by only yoga methods.[7] In another report, Vahia[6] claimed a 93% improvement rate in 15 asthmatics undergoing yoga therapy. Other studies carried out in Yoga centers in India also claimed that other standard yoga practices were effective with asthma as well. [5,715,16]

We hypothesized that results similar to those reported elsewhere would be obtained here with asthma patients of different ethnicity. In contrast, our studies showed no significant improvement in medication usage in patients practicing yoga. Failure to confirm our hypothesis may be due to inappropriate exposure of the patients to the Yoga philosophy, a short study period, and a possible lack of positive attitude with asthmatic patients in the Indian environment at institutions solely devoted to yoga, where yoga was born and has been known for thousands of However other investigators reported decreased blood pressures it hypertensive subjects. [17,18] who practiced yogic technique combined with biofeedback.[19-21]

In our study, no significant improvement of respiratory function, such as FEV_1 and FMEF 0.25-0.75, was observed after yoga therapy in the yoga group and only FVC values improved slightly during the study period. The improvement of FVC alone without improvement of either FEV_1 or FMEF 0.25-0.75 is not indicative of changes consistent with asthma. A similar result was obtained in a much larger study by Nagarathna et al.[10] wherein 51 patients were evaluated over a 6 month period, although the authors do report a significant improvement of FVC with no improvement of FEV_1, or FMEF 0.25-0.75 or peak flow rates. Early studies on Hatha Yoga by Udupa et al.[2] showed a significant improvement in respiratory function, with lowered rate of respiration, increased expansion of the chest, vital capacity, and breath-holding time in 12 young, (23.0+3.36 years) normal male volunteers.

The Weekly Questionnaire revealed that the yoga subjects were more positive and relaxed compared to the control group. Using mental and muscular relaxation therapy, The yoga group in general exhibited a more positive attitude, feeling of well being and felt less panicky over the period of the study. There was little difference between the two groups regarding the pulmonary weighted score. This could be due to the possibility that the yoga did not result in any significant change in their asthma control in the short period of the study or that the subject number may be small to derive any conclusions. Using mental and muscular relaxation therapy, Erskine[31] observed a moderate correlation between objective respiratory measurement of improvement (FEV_1) and subjective assessment of improvement.

TABLE VI

Pulmonary Function Date

Yoga Group	Baseline	4 Weeks	6 Weeks	Values
FVC (Liters)	4.31 (1.06)	4.39 (1.12)	4.51 (1.18)	NS
FEV_1 (Liters)	3.22 (0.68)	3.10 (0.86)	3.29 (0.82)	NS
FMEF 25 - 75%(Liters /second)	2.95 (1.26)	2.36 (1.15)	2.57 (0.98)	NS
Control Group	**Baseline**	**4 Weeks**	**6 Weeks**	**Values**
FVC (Liters)	4.99 (1.55)	4.97 (1.67)	5.63 (1.40)	NS
FEV_1 (Liters)	4.02 (1.64)	3.60 (1.57)	4.19 (1.05)	NS
FMEF 25 - 75%(Liters /second)	3.11 (1.30)	3.00 (1.80)	3.64 (1.86)	NS

Values represent means, standard deviation in parentheses.

The proble reasons for the lack of statistical difference in several of the parameters between the two groups may be due to the fact that the number of subjects was too small; their pulmonary physiology is basically normal to start with, and such yoga practices need to be performed over a longer period of time. These points need to be considered in future studies in this field.

The yoga group reported a better sense of well being overall with more positive attitude and enthusiasm based on the Weekly Questionnaire, This could be all important factor to be considered in view of the study period, the majority of control group patients switched to the yoga practice. The patients in the yoga group continued to perform yoga exercises on a regular basis. The long-term effects and the relative therapeutic value of the yoga techniques in asthma remains to be established.

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PRELIMINARY STUDIES OF YOGA THERAPY FOR BRONCHIAL ASTHMA

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SUMMARY

Preliminary studies to ascertain the efficacy of Yoga therapy in the treatment of bronchial asthma and to develop suitable set of yogic practices are presented in this report.

The data clearly indicates a significant qualitative improvement in all the following parameters:

1. Severity of attacks
2. Duration of attacks
3. Attacks per week
4. Nasal Allergy and
5. Medication

This work has paved way to more systematic research to establish the efficacy of Yoga therapy in the treatment of bronchial asthma.

INTRODUCTION

The past few decades have revolutionised the pattern of life of man in the whole world. The life is geared to the growth of civilization characterized by material prosperity at the cost of mental peace and physical heatlh. Notwithstanding the tremendous advancements made in the field of modern medical science and the understanding of the human system, new diseases have cropped up continuously challenging the advent of new drugs. Disorders of the psychosomatic type have posed greater challenges than ever to medical researchers who have started slowly realising the limiations of the somatic approach. Yoga is prominent amongst the new principles and techniques available for treating such problems on a holistic basis. Although yoga has been used in India over centuries for treating diseases, it is gaining recognition in the modern medical field as a special line of treatment only over the last decade. Now, there is scientific evidence[3, 6] for the beneficial effects of Yogic practices for some stress induced disease like high blood pressure,[4, 10] bronchial asthma[1, 2, 5] anxiety neurosis[7], insommia[8], etc.

Yoga is a system for the complete development of the personality[12] - physical, mental, intellectual, vital and spiritual - of a human being. It is a methodical, conscious effort towards self perfection by the unfoldment of the latent potentialities in an individual. In practice, it is a technique of calming down of the mind. It is the hypersensitivity and psychological conflicts leading to emotional upsurges that cause great stresses at the subconscious level. This may percolate in to the physical frame mnifesting as diseases. [3,6,8] Hence, Yoga in its general methodology of perfecting an individual, through removal of stresses, contains the therapeutic aspects of treating such stress induced diseases. Bronchial asthma, characterised by episodic airway obstructions with intervals of complete normalcy is a well recognised psychosomatic ailment. Reported herein is the preliminary observations in the use of Yogic practices for the treatment of bronchial asthma using an integral technique of physical exercises and Yoga posture (asanas), breathing practices and Pranayama, cleansing processes (Kriyas) and meditation.

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Yoga Asanas as distinguished from physcial exercises are special physical postures congenial for calming down the mind and for developing stability of the nervous system and the power of forbearance. Prana is the inner vital life entity and Pranayama is to gain control over Prana. While simple breathing practices help to normalise the shallow, haphazard breathing. Pranayama uses certain slow breathing Pranayama rhythms and pattern to tranquil the mind and to reduce the metablic rate and strengthen the respiratory and nervous systems. Kriyas are techniques developed in Yoga to cleanse the interior of the body like nasal passages, alimentary tract etc. They also activate and revitalise the internal organs. Meditation is a direct method of calming down the mind and allowing the mind to stay in a single thought. Deep relaxation, freshness and alertful rest are the characteristics of meditation. An appropriate combination of these practices provides a simple and effective tool to solve ones own psychological conflicts and attenuate the emotional upsurges. Thus, the deep rooted subconscious stresses causing ill-effects on the some are erased.

MATEIRAL AND METHODS

The data on 46 patients between 12 to 65 years of age with established bronchial asthma with or without nasal allergy have been presented here. They all had either seasonal or perennial episodic attacks of airway obstruction (wheezing) with intervals of normal health. Only two of the chronic patients had emphysema, leading to continuous wheezing and breathlessness, all of them starting with episodic asthma. In all the patients the airway obstruction was precipitated by one or more of the usual factors like change of weather, dust, smoke, fried food, exercise, emotions or infection.

A basic set of Yogic practices (Table 1) was taught to most of these patients, by Yoga teachers trained speically for the purpose. The method is to start with simple practices and lead them to the complete basic set depending on the capacity of the individual to perform without strain. In some of the aged and/or severe cases, some of the practices were omitted. It is important to check the over enthusiasm in the initial stages lest they may become incapacitated by the strain of the practices. Normally one hour period is adjusted to fit some Asanas, Pranayama and meditation. Kriyas replace the Asanas once a week. However, the Kriyas, Jalaneti and Vaman Dhouti, are performed daily in some specific cases to enhance the benefits.

While taking history from these patients, special care was taken to collect the details about the following parameters used to assess the results of this study: severity, duration, number of attacks per week, nasal allergy and medication (the number of tablets per week of the bronchodilator and / or antihistamine tablets used). The same data were collected before and after the initial course of 4 weeks of Yoga training under supervision. Table 2 shows the scoring of the parameters used for the analysis.

RESULTS AND DISCUSSION

The basic data taken on patients suffering from bronchial asthma, were recorded in a tabular form. From the case sheets it is noted that there was a noticeable improvement in the general

TABLE 1 Basic Set of Yogic Practices Used

	Number	Duration
Sithilikarana Vyayama		
1. Jogging/ runnign		2
2. Forward - Backward Bending	10 times	1
3. Twisting of the waist	10 times	1
4. Back-stretch or Tiger- stretch or Wall posture	10 times	1
Savasana		2
Asanas		
Suryanamaskar	3 times	6
Standing :		
1. Ardhakatichakrasana	(both sides)	1
2. Ardhachakrasana		1/2
3. Padahastasana		2
4. Parivritta Trikonasana	(both sides)	2
Sitting :		
1. Pascimatanasana		2
2. Supta Vajrasana or Ustrasana		1/2
3. Yogamudra or Sasankasana		2
4. Ardhamatsyendrasana	(both sides)	2
5. Mayurasana		1/2
Savasana		4
Prone :		
1. Bhujangasana		1
2. Salabhasana or Dhanurasana		1/2
Supine :		
1. Sarvangasana or Viparitakarani		3
2. Matsyasana		1
3. Halasana		2
4. Savasana		2
5. Sirsasana		2
6. Savasana		10
Breathing & Pranayama		
Kapalabhati	120 Strokes	1
Sectional Breathing	9 rounds each	4
Nadi Suddhi	9 rounds	2
Sitkari	5 rounds	2
Bharamari	5 rounds	2
Silence		8
		70 minutes

KRIYAS

Agnisara, Nauli - Daily in the morning

Jala Neti, Cathetor Neti } Weekly once
Vaman Dhouti

feeling of all the patients. They all felt more energetic, healthy, lively and enjoyed the immediate effects of Yoga practices. This also helped them to continue the practices and gain self-confidence that their stresses could be relieved easily through the Yoga techniques.

In this preliminary study, although we lack many of the objective parameters (quantitative measurements), which have been introduced in the further studies, an attempt has been made to score the symptoms (Table2). Student 't' test was applied to assess the signifinance of the difference of the mean values before and after the practices for all the parameters selected. As can be seen through this analysis in Table 3 there was a significant improvement with a probability value 'P' less than 0.005 in all the parameters used i.e., the severity, duration of attacks, number of attacks per week, nasal allergy and reduction in the dose of the bronchodilators used (medication).

Table 2 Definition and Description of Parameters used for Statistical Analysis of Patients suffering from Bronchial Asthma

No. Parameters	Score	Description (Criteria)
1. Severity		The severity of Asthma
	1	Mild .. Requiring less than 6 injuries/ year
	2	Moderate .. 6 to 12 injections/ year
	3	Severe .. More than 12 Injuries
2. Duration		The duration of each episode
	1	Small .. Less than Half Hour
	2	Moderate .. 1/2 Hr. to 2 Hrs.
	3	Long .. Greater than 2 Hrs.
3. Attacks per week		Number of episodes of airway observed in a week
4. Nasal Allergy		Sneezing, Running Noses, Blocking of Nose (Score 1 each)
	1	If any one of the above is present
	2	If any two are present
	3	If all are present
5. Medication		Number of administrations of bronchodilator drugs per week including tablets, injections and Ayurvedic powders. Inhalers not included.

TABLE 3 Statistical Analysis

N		Initial	Final	Difference	t	P
Severity	39	1.05 ± 0.85	0.72 ± 0.79	0.03 ± 0.53	3.89	Less than .005
Durations	41	2.54 ± 0.95	1.24 ± 0.99	1.29 ± 1.05	7.87	Less than .005
Att/ Week	46	5.43 ± 3.41	3.28 ± 3.22	6 4.15 ± 3.00	4.28	Less than .005
N. A.	31	2.26 ± 1.30	0.84 ±0.89	1.42 ± 1.15	6.88	Less than .005
MED	42	9.46 ± 7.44	4.01 ±4.47	5.46 ± 6.40	5.53	Less than .005

It appears that the improvemet noticed in asthmatics can be attributed to the following effects of Yogic practices:

1. Release of stresses : The psychological conflicts and emotional upsurges cause great stresses at the subconscious level. They percolate into the physical frame manifesting as bronchial

asthma. The deep relaxation at physical and mental levels achieved through Yogic practice removes these stresses and brings about the benefits observed.

2. Decreasing the allergy factor : The desensitizing effect of Yogic practices like cleansing process (Kriyas) contributes a great deal to decrease the allergy. Also the stamina developed by the patients after the practice of breathing techniques and Yoga practice of breathing techniques and Yoga postures and contributory to remove the allergy and to prevent frequent episodes. The susceptibility to infection, one of the important precipitating factors for frequent and prolonged episodes is also reduced.

3. Removal of the panic element : It is well known that anxiety is a prominent factor which worsens the airway obstruction in asthma and calls for more bronchodilator drugs. The calming of mind which is the core of Yogic practices helps the patients to allay their anxiety and reduce the severity or asthma. This removal of panic helps the patients to diffuse the episode often effectively with minimum use of drugs.

These results indicate a distinct possibility of using Yogic practices presented in this communication to treat bronchial asthma.

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ORIGINAL RESEARCH

YOGA THERAPY FOR NIDDM; A CONTROLLED TRIAL

Robin Monro, Joyce Powar, Anil Coumar, Nagarathna R, and Dandona P.

Summary

Objective - To study the potential of yoga therapy as an aid to the management of non-insulin-dependent diabetes mellitus (NIDDM).

Design - A randomised trial comparing the policy of offering yoga classes with that of non - intervention,

Setting - Royal Free Hospital, London.

Patients - 21patients with NIDDM, taking medication (13) or on diet control alone (8).

Intervention - Patients were randomised to control (11) and yoga (10) group. Both continued their normal medication and diet. The control group had no additional intervention. The yoga group was offered yoga classes with a standard set of postural, breathing and relaxation exercises; most patients attended one or two classes per week and practised one or more times per week at home.

Main outcome measures - Fasting blood glucose (FBG) and glycated haemoglobin (HbAlc), assayed before randomisation and after 12 weeks of yoga.

Results - Both FBG and HbAlc improved significantly ($P<0.05$) in the yoga group, compared to the controls, three patients in the yoga group were able to reduce their medication. Most patients in the yoga group wanted to continue attending yoga classes, and reported feeling better, less anxious and more in control of themselves. No adverse effects were observed.

Conclusions - Offering yoga classes to NIDDM patients at a diabetic clinic attracted significant numbers of patients and led to improved glucose homeostasis. Further work is required to (a) optimise the yoga effect, (b) assess its range of applicability, (c) compare its efficacy to that of other behavioural interventions and (d) determine its mode of action.

INTRODUCTION

Yoga offers a largely unexplored, widely available resource for the management of stress-related ailments. Research has demonstrated its effectiveness for hypertension[1], bronchial asthma[2] and several other conditions [3]. The recent report that a combination of diet, exercise and yoga can reverse coronary heart disease[4] has drawn widespread interest. There is evidence[5] that yoga can also benefit people with non-insulin-dependent diabetes mellitus (NIDDM). We report here the first randomised, controlled trial of yoga for NIDDM. We have simply compared yoga with non-intervention, omitting controls for attention and exercise. While these may well contribute to the effects of yoga, they are themselves known to be complex phenomena, and we consider it to be judicious to make a preliminary confirmation that yoga is feasible and beneficial before embarking on expensive investigations into all its possible modes.

METHODS

We recruited 21 volunteers with NIDDM through the Royal Free Hospital outpatient clinic and the local media, excluding those with end stage liver or kidney disease, or congestive cardiac failure. Thirteen were taking medication for NIDDM, the remainder were on diet control alone. Only one had practised yoga previously (not recently). Volunteers were allocated to yoga and control groups without stratification by drawing lots. Table 1gives biodata for two groups.

Table 1 Biodata of patients

	Yoga	Control
No. of cases	11	10
No. of men/ women	5/6	5/5
Age: range	45 - 67	46 - 66
Age: mean (SD)	53 (6.0)	57 (7.3)
No. taking meditation	8	5

The control group continued with normal medical treatment only. The yoga group in addition to normal treatment was offered five yoga classes per week at the hospital. Most patients attended one or two classes per week and practiced one or more times per week at home. The 90-minute classes utilised a standard sequence of simple postural, breathing and relaxation exercises, taking appropriate precautions for patients with hypertension or lower back pain[6].

Fasting blood glucose (FBG) and glycated haemoglobin (HbAlc)[7] were assayed before randomisation and after 12 weeks of yoga. Covariate analysis was carried out with BMDP Statistical Software. A simple questionnaire on subjective responses to yoga was administered by post to the patients in the yoga group (100% response).

RESULTS

Table 2 shows that FBG decreased in the yoga group but increased in the controls, the difference between the changes in the two groups being 0.60-(-1.20)-1.80($P<0.05$; 95% confidence limits 0.27- 3.33). The corresponding changes in HbAlc were 1.56-(-0.20)=1.76($P<0.05$;95% confidence limits 0.20-3.32). Table 3 shows that similar confidence limits for the changes were obtained using the final values for FBG (or HbAl) adjusted by covariate analysis for sex, age and initial FBG (or HbAl)

Since FBG reflects glucose control at the time of blood sampling, and HbAlc reflects average glucose levels over the previous (approximately) six weeks, it follows that glucose levels in the yoga group fell significantly, relative to the controls, both at a single time point, after 12 weeks of yoga, and over the preceding (approximately) six weeks. Three of the patients in the yoga group were able to reduce their dose of tablets, since their blood glucose levels fell markedly following the initiation of yoga therapy. It follows that glucose homeostasis improved in the yoga group compared to the non-intervention group.

Questionnaires, administered by post, indicated that all the patients in the yoga group, except one, wanted to continue attending yoga classes, and the majority felt better, less anxious and more in control of them selves. Two reported improved mobility. No adverse effects were observed.

Table II : Fasting blood glucose (FBG) and glycated haemoglobin (HbAlc) before and after 12 weeks of yoa

	FBG (SD) HbAlc (SD) (mmolc/ 1)		FBG (SD) HbAlc (SD) (% Hb)	
	Yoga	Control	Yoga	Control
No. of cases	11	10	11	10
Mean before	8.7 (3.9)	7.6 (1.9)	10.3 (3.4)	8.9 (2.3)
Mean after	8.1 (4.1)	8.8 (3.0)	8.7 (2.4)	9.1 (1.2)
Difference	0.60 (1.6)	-1.20 (1.8)	1.56 (1.8)	-0.20 (1.6)

Table III : Mean changes in FBG and HbAlc (after minus before 12 weeks of yoga), adjusted by covariate analysis for sex, age and initial FBG. 95% CL = 95% confidence.

	FBG (SD)	HbAlc
Yoga (11)	7.7 (1.7)	8.3 (1.2)
Control (10)	9.3 (1.7)	9.5 (1.2)
Diff (95% CL)	1.576 (0.01,3.5)	1.205 (0.13, 2.29)

DISCUSSION

The fasting blood glucose and HbAlc assays show that glucose homeostasis improved in the yoga group, compared to the controls, over the 12-week period of the trial. The three reductions of medication in the yoga group, with no reductions in the control group, strengthen this conclusion.

Our yoga 'package' included several different components, known to help with glucose control in NIDDM, including exercise, diet, relaxation and counselling. The effect of exercise in increasing glucose utilisation would have been small, since the yoga employed is very gentle and the average heart rate over a yoga session is about the same as the resting level; exercise therapy for diabetes involves at least half an hour of active exercise with heart rate well above the resting level.

Surwit and Feingloss[8] reported that relaxation training leads improved glucose tolerance in NIDDM patients without affecting insulin sensitivity or glucose-stimulated insulin secretory activity. This could be mediated by decreases in sympathetic and adrenal cortical activity. Yoga presumably has similar effects but may also act in other ways, since it includes postural and breathing exercises in addition to simple relaxation.

It might be argued that attention, alone, could have caused the observed effects, since the control group did not have periods of attention, matching those of the yoga classes. It would be difficult to rule out such a possibility, since attention is a complex process, and the quality of attention provided by yoga instructor undoubtedly contributes to the effectiveness of the therapy. To study this scientifically will require considerable sophistication, since attention in a yoga class cannot readily be dissociated from the practices being taught; controls for attention cannot be administered like placebo tablets in drug trials. However, this methodological difficulty does not detract from the evidence that yoga can benefit people with NIDDM. The potentials of yoga as a therapy for NIDDM must stand upon comparison with other therapies (including those based primarily on attention). Before this can critically be accomplished, yoga therapy for NIDDM must be further characterised.

The absence of adverse effect is consistent with observations by one of us (RN), at her yoga therapy clinic, on hundreds of cases of diabetes. It might be thought that yoga could exacerbate the tendency to neuropathic arthropathy in people with diabetes but, contrary to popular misconceptions, therapeutic yoga uses very gentle exercises (with body awareness), and avoids putting any strain on the musculoskeletal system. Indeed, yoga may offer a viable alternative to exercise therapy in cases of arthropathy, and might actually benefit the condition.

Yoga therapy for NIDDM should now be studied to (a) optimise it, (b) determine the extent to which the effects are due to exercise, relaxation, 'attention placebo' or other factors and (c) compare its efficacy and range of applicability to those of other behavioural intervention.

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MEASURING THE EFFECT OF YOGA IN RHEUMATOID ARTHRITIS

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SIR - RA is a complex disease which requires the broad skills of a multidisciplinary team for effective management. Increasing attention is now given to the patient's role with the team. With emphasis on self-help and a greater degree of control by the patients of their disease and its treatment. A logical extension of this process is the use of less conventional methods of management in conjunction with a conventional medical treatment regime. In this context the physical and psychological control and relaxation induced by yoga appeared attractive but reservation has been expressed regarding the applicability of yoga to patients with physical handicap. We therefore set up a pilot study to explore the ability of patients with severe RA to participate in a yoga programme and to make observations regarding any benefit obtained. We believe this is the first controlled trial of yoga for RA [1] . Twenty volunteers with RA of sufficient severity to require disease-modifying therapy were selected for the study. Ten entered a yoga programme and 10 acted as controls. Table 1 gives biodata for the two groups.

Table 1 Biodata of patient

	Yoga	Control
No. of cases	10	10
No. of Men/ Women	1/ 9	2/ 8
Age range (Yr.)	15 - 72	40 - 64
Age mean. Yr(S.D.)	52.5 (19.3)	57 (8.1)
Mean duration of RA. yr (S.D)	4.85 (11.6)	19.1 (12.7)

The control group continued with normal medical treatment only(without modification). The yoga group in addition to normal treatment (without modification) took part in a programme of daily 2-h sessions 5 days a week for 3 weeks, followed by weekly 2-h sessions for a further 3 months. The yoga sessions took place in the outpatients department. On days without sessions, patients practiced for 10-30 min at home. The practise, described elsewhere[2], comprised gentle physical movements and postures(asanas) tailored to the individuals, based on the yoga principles of performing them with ease. Slowness and deep awareness; breathing techniques (pranayama) aimed at control and slowing of the breathing rate, meditation, lectures and discussions on yoga philosophy, and sessions aimed at softening the emotions. The movements and postures were modified or omitted to avoid strain when joints were inflamed.

Assessments were carried out 'blind' by qualified nurses at the beginning of the study and after 3 months. They comprised (a) standard rheumatological measurements: ring size, duration of morning stiffness, grip strength and the Stanford Health Assessment Questionnaire Disability Index (HAQ) and (b) psychological assessment: the General Health Questionnaire (GHQ). There was no significant difference in levels of depression between the yoga and control groups, as indicated by GHQ scores at the start of the study. Eleven patients in the yoga group completed the first 3 weeks but four dropped out subsequently based of difficulty with transport. All patients completed the assessments at the end of the trial, except for one of the yoga dropouts.

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Table II shows that lefthand grip strength increased by 63 in the yoga group and by 8 in the control group; the difference (55) between the two groups was significant (P<0.02: 98% confidence limits 2-108). Right hand grip strength also increased in the yoga group, relative to the controls. But the difference was not significant. Table III shows that similar confidence limits for the changes were obtained using the final values for grip strength adjusted by covariate analysis for age, duration of RA and initial grip strength. The yoga group also improved relative to the controls in HAQ scores and left hand ring sizes, through not to significant levels. The other indicators remained constant or improved slightly in the yoga group, relative to the control. All six patients who completed the yoga course derived sufficient subjective benefit to want to continue. Although this study was too small and too short for definitive conclusion, it does show that patients with RA even when this is of considerable severity are capable of participating in a yoga programme and of deriving both subjective and objective benefit from it and that this can be measured using conventional clinical trial techniques. The major problem was the logistic one of transport to the yoga sessions. We believe there is a need for a larger trial to evaluate yoga in R.A. and that an appropriate control group would be patients treated by more conventional relaxation techniques.

Table II Grip Strength

	Grip Strength (mm Hg)			
	Left hand		Right hand	
	Yoga	Control	Yoga	Control
No. of cases	10	10	10	10
Mean before (S.D.)	141 (66.1)	137 (66.3)	145 (69.0)	137 (77.5)
Mean after (S.D.)	204 (66.0)	145 (63.1)	177 (84.9)	142 (79.0)
Difference (S.D.)	63.2 (60.9)	8.2 (23.7)	324 (66.3)	5.5 (38.7)

Table III : Mean changes in grip strength (after minus before 3 monthes of yoga). Adjusted by convariate analysis for age duration of RA. and initial grip strength.

	Grip Strength (mm Hg) (S.D)		
	Left		Right
Yoga (10)	198		168
Control (10)	151		151
Difference (98% CL)	47	(5.1 - 89)	-
Difference (90%)		-	17(-18.1 - 52)

Meryl Bye and Hilde Pawas took the yoga classes: B. Darve and K. Adams carried out the assessments: Dr A.L. Johnson advised on statistical analysis: Marks and Spencer contributed to the costs of data processing.

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IMPROVEMENT IN HAND GRIP STRENGTH IN NORMAL VOLUNTEERS AND RHEUMATOID ARTHRITIS PATIENTS FOLLOWING YOGA TRAINING

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Abstract: The present study aimed at assessing the effects of a set of yoga practices on normal adults (n=37), children (n=86), and patients with rheumatoid arthritis (n=20). An equal number of normal adults, children, and patients with rheumatoid arthritis who did not practice yoga were studied under each category, forming respective control groups. Yoga and control group subjects were assessed at baseline and after varying intervals, as follows, adults after 30 days, children after 10 days and patients after 15 days, based on the duration of the yoga program, which they attended, which was already fixed. Hand grip strength of both hands, measured with a grip dynamometer, increased in normal adults and children, and in rheumatoid arthritis patients, following yoga, but not in the corresponding control groups, showing no re-test effect. Adult female volunteers and patients showed a greater percentage improvement than corresponding adult males. This gender-based difference was not observed in children. Hence yoga practice improves hand grip strength in normal persons and in patients with rheumatoid arthritis, though the magnitude of improvement varies with factors such as gender and age.

Key words : *Hand Grip Power; Yoga; Age; Gender; Rheumatoid arthritis.*

INTRODUCTION

Hand grip strength has been used as an objective clinical measure in a variety of situations. For example, grip strength has been used to assess general strength in order to determine work capacity (1), for extent of injury and disease processes and the potential for and progress in rehabilitation (6).

The practice of yoga for three months was found to increase hand grip strength in male volunteers whose occupation was to teach physical education to high school students (9). This category of subjects already had 8 to 10 years of experience in physical education and sports and may have been considered to be more likely to improve their muscle power, for that reason. School children, of both sexes between 12 and 15 years of age, also showed improved hand grip strength following a yoga residential camp, which had yoga breathing, or *pranayama* (i.e., voluntarily regulated breathing) as the main practice (8). This improvement in hand grip strength following yoga, was also seen in patients in whom the function of gripping is abnormal due to disease. Patients with rheumatoid arthritis having pain and swelling of finger joints showed a trend of improvement in hand grip strength following a daily yoga session for 5 days a week, for 8 weeks, followed by weekly 2-hour sessions for a further 3 months (2). Hence the earlier studies, described above, investigated either selected subjects (e.g., adults with training in physical education), selected yoga practices (e.g., *pranayama*), or patients who were given daily sessions of yoga practice, rather than training in lifestyle change.

The present study aimed at assessing the effect of yoga training on grip strength in: (i) adults who had no special earlier physical training, (ii) children, following a ten day yoga camp without specific emphasis on any one practice, and (iii) patients with rheumatoid arthritis who were given an intensive yoga therapy practice, including suggestions for life style and mental attitude change.

METHODS

Subjects

There were 3 categories of subjects: (i) adults (n=37), (ii) children (n=86), and (iii) patients with rheumatoid arthritis (n=20), diagnosed based on standard clinical criteria. An equal number of adults volunteers (n=37), children (n=86), and patients with rheumatoid arthritis (n=20), who did not practice yoga formed the respective control groups. Details (e.g., age range, number of subjects of each gender), are provided in Table 1. Subjects were tested for hand dominance, by asking questions about which hand was used to comb the hair, throw a ball, or to write. Two left-hand dominant subjects were excluded from the study.

Table : 1 Details about subjects

SI.No.	Category	Group	Gender	Number (n)	Age range (year)	Group mean age ± S.D. (years)
1	Adults (n = 74)	Yoga	Male	21	22 - 50	31.0 ± 7.4
			Female	16	22 - 49	29.9 ±7.1
		Control	Male	21	22 - 50	32.3 ± 6.7
			Female	16	20 - 40	26.4 ±6.4
2	Children	Yoga	Male	61	12 - 15	13.6 ± 1.0
			Female	25	12 - 15	13.5 ±0.9
		Control	Male	61	12 - 15	13.7 ± 1.0
			Female	25	12 - 15	14.0 ±0.8
3	Patients	Yoga	Male	10	23 - 43	33.0 ± 7.7
			Female	10	26 - 43	35.0 ±5.3
		Control	Male	10	21 - 42	31.7 ± 7.7
			Female	10	23 - 41	31.4 ±5.5

Both groups (yoga, control) of patients were allowed to continue medication which was prescribed for them. 10 out of 20 patients of the yoga group and 6 out of 20 patients of the control group were on NSAIDs (non-steroidal anti-inflammatory drugs) at the start of the study. The other patients were not receiving medication. The drug score was noted as number of NSAID tablets per day. This was noted every day. However, for analysis values on Day 1 and Day 14 were used.

Design of the study

The three categories of subjects, viz., adults, children and patients with rheumatoid arthritis, received yoga for varying periods based on the yoga camp they were attending. For example, the duration of the yoga training camp was 1 month for adults (n=37), 10 days for children (n=86), and 14 days for rheumatoid arthritis patients (n=20). During these periods of yoga practice, an equal number of "control" subjects of comparable age and sex were studied at the beginning and end of a period during which they did not practice yoga, but carried on with their routine activities. Hence "control" group subjects were assessed as follows: adults (n=37), after 1 month, children (n=86) after 10 days, and patients (n=20) after 14 days.

Assessments

Hand grip strength of both hands was assessed using a hand grip dynamometer (Anand Agencies, Pune, India). Subjects were tested in 6 trials, 3 for each hand alternately, with a gap of 10 seconds between trials. During the assessment subjects were asked to keep their arm extended at shoulder level, horizontal to the ground as has been described earlier (3). The maximum value obtained during the three trials was used for statistical analysis.

Interventions

Certain yoga practices were taught common to all three categories of subjects (i.e. adults, children, and patients). These included yoga *asanas* or postures (60 minutes), pranayama or voluntarily regulated breathing, meditation, and lectures about yoga philosophy. However, as part of the respective courses other practices were specific for each of the three category of subject, i.e., additional yoga postures for adults, memory games for children which involved chanting verses from ancient Indian texts, and joint loosening exercises for patients with rheumatoid arthritis.

Analysis

The before and after comparison of each category of subjects was analyzed for subjects of each gender separately, using the paired "t"-test (two-tailed) .

Results

Subjects of all three categories (i.e., adult and child volunteers and adult patients with rheumatoid arthritis) showed significant increases in hand grip strength following yoga. The control group, who did not practice yoga showed no change. The group mean values ±S.D. and percent change where significant are given in Table II.

Among normal volunteers the percentage increases following yoga were comparable for male adults and children, for both hands after 30 days (for adults) and 10 days (for children) of yoga, respectively. However, for adult females following 30 days of yoga, the percent increase in grip strength was almost double that of girls after 10 days of yoga and was also almost double that of adult males, who also received 30 days of yoga training. Percentage increase of boys and girls were comparable. Patients, who were all adults, showed greater percentage increase following 15 days of yoga compared to normal adults after 30 days of yoga. Among patients, female patients showed an increase which was about thrice the increase observed in male patients.

The actual values (rather than percentage increase) showed that at baseline (i) adult male volunteers and patients had higher grip strength than corresponding female subjects (volunteers and patients, respectively). (ii) The gender difference in improvement in grip strength following yoga was smaller between boys and girls. (iii) For all categories of subjects right hand grip strength was greater than that of the left hand.

Finally, the drug score data were analyzed. There was a significant reduction in Drug Score following 14 days of yoga, as values changed from 2.20±1.4 (Day 1) to 0.60 ± 0.5

Table II : Hand grip strength in adult volunteers, children, and adult patients of both gruoups (yoga and control), before and after yoga or the non yoga control period, respectively. Values are group mean ± group S.D.

Categroy	Gender		Hand	Before(kg)	After(kg)	% Change
Adults	M		L	38.4 ± 4.7	43.1 ± 4.7**	12.4
(N = 74)	n = 21	Yoga	R	40.7 ± 4.5	45.5 ± 5.2***	11.8
	F		L	23.8 ± 6.3	30.3 ± 7.1***	27.3
	n = 16	Yoga	R	26.8 ± 7.0	33.3 ± 8.5***	24.3
	M		L	37.9 ± 7.4	37.3 ± 7.6	-1.6
	n = 21	Control	R	39.7 ± 6.2	40.0 ± 6.4	0.6
	F		L	20.3 ± 8.1	19.6 ± 6.9	-3.8
	n = 16	Control	R	22.6 ± 7.2	22.5 ± 6.3	-0.5
Children	M		L	20.8 ± 5.7	22.7 ± 5.9***	8.9
(N = 172)	n = 61	Yoga	R	22.3 ± 6.0	25.1 ± 6.5***	12.2
	F		L	18.7 ± 3.9	20.9 ± 3.3 ***	11.9
	n = 25	Yoga	R	20.1 ± 4.1	23.2 ± 4.0***	15.8
	M		L	22.0 ± 6.4	22.2 ± 6.2	1
	n = 61	Control	R	24.0 ± 7.1	24.5 ± 7.0	1.8
	F		L	18.9 ± 2.7	19.2 ± 3.3	1.9
	n = 25	Control	R	20.8 ± 2.8	22.3 ± 2.9	7.3
Patients	M		L	23.8 ± 4.4	33.2 ± 5.3**	39.5
(N = 40)	n = 10	Yoga	R	27.0 ± 5.7	33.0 ± 5.8***	22.2
	F		L	8.5 ± 3.1	21.1 ± 3.9***	148.2
	n = 10	Yoga	R	10.2 ± 3.0	22.6 ± 4.3***	121.6
	M		L	18.7 ± 6.9	18.4 ± 8.4	-1.6
	n = 10	Control	R	18.4 ± 5.4	18.6 ± 7.1	1.1
	F		L	10.3 ± 4.6	10.9 ± 3.1	5.3
	n = 10	Yoga	R	11.7 ± 3.8	11.4 ± 3.0	-2.6

****P < .001, **P < .002, t-test for paired data, 'after' compared to 'before' for yoga and control group*

(Day 14) [P=0.013). The control group showed no change. The values were: 3.16±1.6 (Day 1) and 1.83±1.3 (Day 14)[P=0.22]. It should be noted however, that at baseline the two groups differed in the following points, viz., (1) 10 of the yoga group were on NSAIDs, versus 6 of the control group, with 20 patients in both cases. (2) The drug scores of the 6 control group patients were higher than those of the 10 yoga group patients at baseline, which may also account for differences in the results of the two groups.

Discussion

The present study has shown that following yoga practice adult and child volunteers and patients with rheumatoid arthritis show significant increases in hand grip strength. At baseline, as expected, adults show higher values than children, and males compared to females (4). The magnitude of increase in grip strength following yoga was maximum for female patients (about thrice the percentage increase observed in male patients, even though the yoga program and the duration were the same), followed by female volunteers whose percentage increase was about double that of male volunteers.

Yoga practice has already been shown to improve grip strength in adult male volunteers trained in physical education (9), in children whose yoga program emphasized *pranayama* (8), and in patients with rheumatoid arthritis who practiced yoga as a single session per day (2). The improvement in hand grip strength after yoga practices, emphasizing *pranayama*, was ascribed to the oxygen requirement-reducing effect of *pranayama*, as the availability of energy and oxidation of glucose is believed to influence the hand grip strength proportionately (5). However, the increase in hand grip strength following other yoga practices, including pranayama could be due to different factors including cognitive components and non-specific arousal (7).

Rheumatoid arthritis patients of the present study showed significant improvement in hand grip strength, whereas patients of an earlier study (2), showed a non-significant trend of improvement. This difference could be related to the fact that the patients of the present study had an intensive, though short duration program. These results may also suggest that improvement may be more rapid following a short-term intensive yoga training program (i.e., in this case 15 days), as opposed to a longer duration (i.e., 8 weeks followed by 3 months), much less intensive program, as described earlier (2). The present study has also shown differences in the percentage increase of improvement in hand grip strength after yoga, related to hand dominance, age, and gender. Right hand values were greater then left hand values, and females showed greater percentage improvement then adult males both for normal volunteers and patients. The exact reason for this difference is not known.

Hence the present results have shown that yoga practice increases hand grip strength, with different magnitudes of percent change depending on gender and age. However it should also be noted that the results, especially the magnitude of change in grip strength following yoga, may have been related to the fact that the values at baseline were lower than for the control group, hence there was greater scope for improvement in the yoga group, to begin with.

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Report No. VKYTRC / 002 / KK / 1980

THE BASIS FOR AN INTEGRATED APPROACH IN YOGA THERAPY

by

173120

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Summary: The basis for an integrated approach for Yoga Therapy rooted in Upanisats and Yoga texts is presented in this report. After presenting a general classification of ailments, the science of psychosomatic diseases is described.

The origin of diseases at Manomaya Kosa (a subtle sheath of our existence) percolates to the gross physical frame through Pranamaya Kosa in which disturbances in the flow of Prana and instability of the Nadis are caused.

The integrated approach is to harmonise and calm down the disturbances at all these levels by Kriyas, Physical exercises, Asanas, Breathing and Pranayama, Meditation and Devotional session, Analysis and Jnana Yoga.

The results of this approach presented elsewhere has shown promising applicational value.

1. INTRODUCTION

Yoga is becoming popular in different parts of the world. For the restless mind it gives solace.[1] For the sick, it is a boon.[2,4,6,25,18B*] For a common man it is the fashion of the day to keep himself fit and beautiful.[13] Some use it for developing memory, intelligence and creativity.[1,3] With its multifold advantages it is becoming a part of education.[3,16] Specialists use it to unfold deeper layer's of consciousness in their move towards perfection.[8,14]

Because of its rational basis, the modern medical system has replaced almost all the traditional systems of medicine in different parts of this globe. It has proved itself most effective in saving man from the fatal hands of contageous and infectious diseases.[12] However, new widespread. psychosomatic ailments are posing a great challenge to the modern medical system. It is here that Yoga appears to make a vital contribution to the modern medical system. In our earlier report[7] we have presented the basic principles and preliminary results of yoga therapy. In contrast to the different methods of yogic therapy using one[4] or more[6,18B] of the yoga practices, we ha used an integral approach in treating various ailments,[7] we present in this report the basis of such an approach.[18] An attempt is made to present this basis in tune with the Yoga tradition, culled out from the original texts of Upanishats and Yoga.[18,19]

2. CONCEPT OF HEALTH AND YOGA

According to the World Health Organisation (WHO) the state of Health is defined as a state of complete physical, mental, and social well being and not merely an absence of disease or infirmity. WHO also suggests a fourth dimension- spiritual Health. It is clear from this definition that health

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and ill-health are not two discrete entities as commonly understood but health should be conceived as a continuous function indicating the state of well being (Figure 1). In the diagram, the 3rd quadrant " the region of ill-health" represents what normally we designate as 'Sickness' Below this, man acts instinctively and is akin to an animal man. * Coming to the first quadrant, the region of 'Normal Alan' the state of normal health is indicated. As one moves along the line further up, he becomes healthier featured by the dormant faculties expressing more vividly in man. This is shown as the region of Super Man, the next region after the human spectrum. In this state, the limitations of normal man namely the strong urges of thirst, hunger, fear and sex are reduced greatly and are fully undercontrol. In the concept of Sri Aurobindo [17] the new faculties of deeper perceptions of the world beyond the five senses emerge in this phase of super human existence. Further growth leads man to unfold even deeper layers of consciousness and widen the spectrum of his knowledge to move towards divinity or perfection. In this march towards perfection, Yoga is a systematic conscious process for accelerating the growth of a human being from his animal level to normalcy, then to super human level and ultimately to divinity. It is a systematic methodology for an all round personality development-physical, mental, intellectual, emotional and spiritual components-of man. Thus, Yoga in its general methodology for the growth of man to divine heights. includes techniques useful for therapeutic applications in making man healthier.

Before we proceed to understand the generation and amplification of illnesses, we present in the next section the Yogic concept of 'Sheaths of human existence'.

3. THE FIVE SHEATHS OF OUR EXISTENCE

Notwithstanding the sincere and subtle, (atomic level) researches, the attempts to understand life as an offshoot of matter, a conglomeration of a complex configuration of atoms and molecules (called DNA & RNA), are leading man to regions of greater complexity. *The decades of subtler and expensive research have yielded much less fruit than expected.

However, better understanding of life appear to be forthcoming with efforts directed in fields of modern psychology[10] and Parapsychology. [11] The forerunner of many of these efforts could be traced back to the work of Kirlian [.19.13.17] Controversies apart, Kirlian photography triggered the interest of a large number of scientists and technologists all over the world. Investigations into the unknown regions of human existence started unravelling the mysteries of 'life'. Parapsychology Institutes have grown in number. Scientists have started reconsidering their hypothesis that 'life' also is an emergence from matter. They recognize some existence beyond the physical body. The scientific study of the Human Aura by Tart 15 (See Page 137), the professor of psychology at the University of California at Davis, USA, delineates the following sheaths of human aura:

1. The physical aura
2. The psychological aura
3. The psychical aura &
4. The projected aura.

In relating the experience of the psychics the term's human aura, Etheric double, Astral body, Thought-forms[15] etc have been studied. Nirmala [8] has summarised the various systems about the layers of consciousness as depicted in Indian philosophical and Yogic texts.

Food, Sleep, Fear & Procreation (Instinctive actions) are common to men and animals. It is the conscious thinking faculty, the power of descrimination that characterises man.

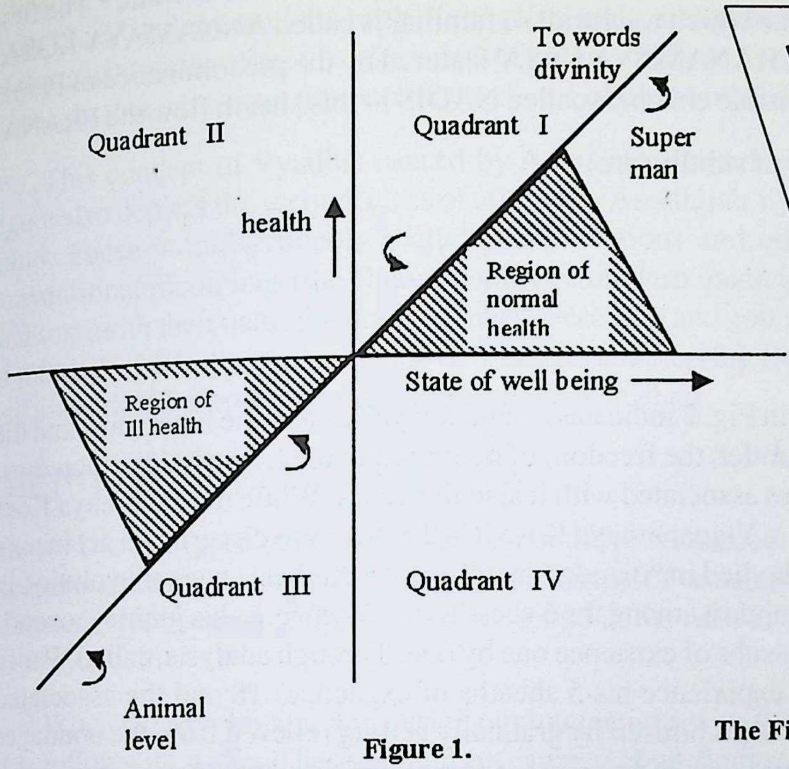
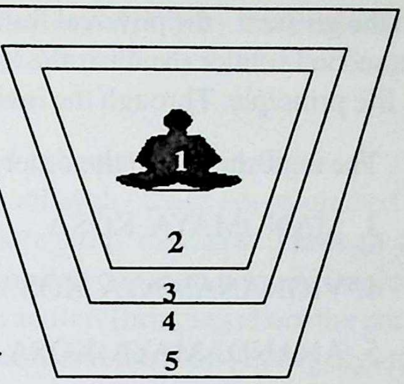

To words divinity
Quadrant II
Quadrant I
Super man
health
Region of normal health
State of well being
Region of Ill health
Quadrant III
Quadrant IV
Animal level

Figure 1.
Concept of Health



1. ANNAMAYA KOSA
2. PRANAMAYA KOSA
3. MANOMAYA KOSA
4. VIJNANAMAYA KOSA
5. ANANDAMAYA KOSA

Figure 2.
The Five Sheaths (Kosas) of our existence

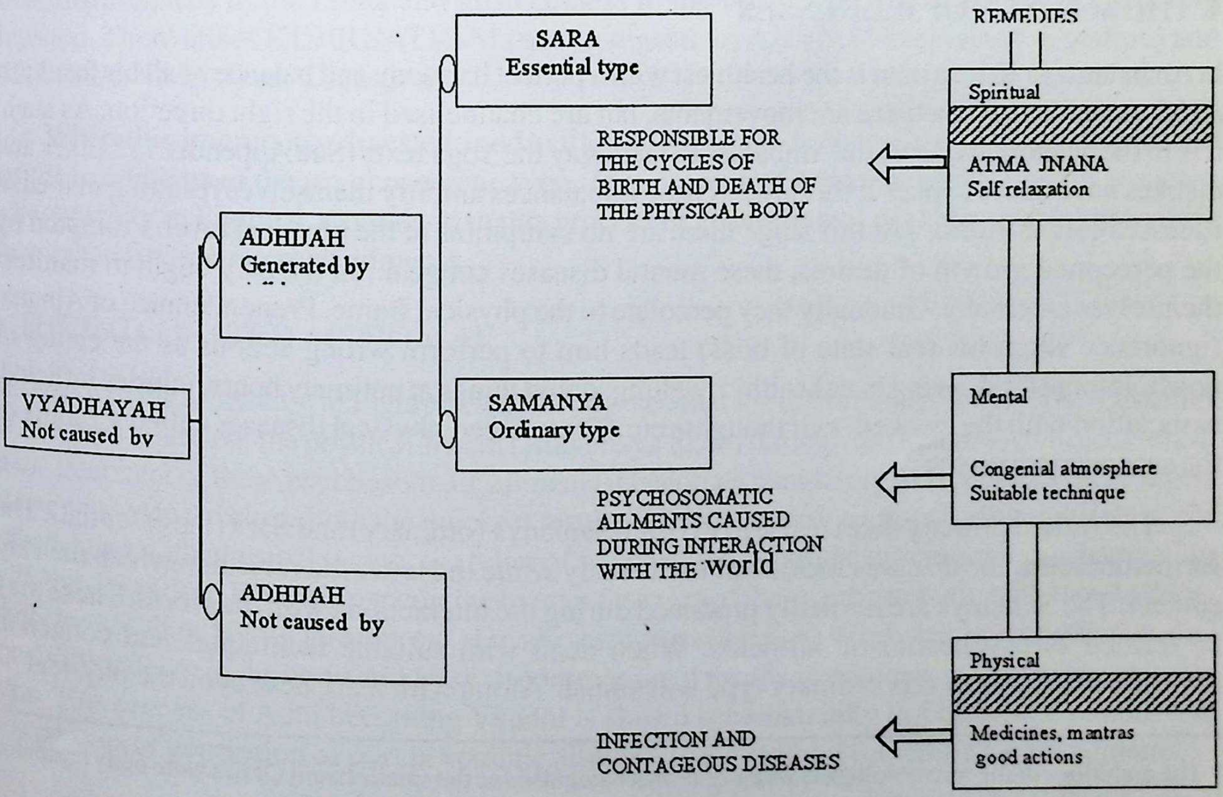

SARA
Essential type
REMEDIES
Spiritual
RESPONSIBLE FOR THE CYCLES OF BIRTH AND DEATH OF THE PHYSICAL BODY
ATMA JNANA
Self relaxation
ADHIJAH
Generated by
VYADHAYAH
Not caused by
SAMANYA
Ordinary type
Mental
Congenial atmosphere
Suitable technique
PSYCHOSOMATIC AILMENTS CAUSED DURING INTERACTION WITH THE world
ADHIJAH
Not caused by
Physical
INFECTION AND CONTAGEOUS DISEASES
Medicines, mantras good actions

Figure 3.
A Schematic Diagram of our Ailments (See Appendix 1)

In the tradition of Yoga and Upanisats there are five sheaths of existence of Man.[13] The first and the grossest - the physical frame which we are all so familiar is called ANNAMAYA KOSA. The second subtler sheath is the 'PRANAMAYA K0SA' featured by the predominance of Prana, the life principle. Through the invisible channels called NADIS in this sheath flow the PRANA.

The next sheaths in the order of subtlity are

3. MANOMAYA KOSA
4. VIGNANAMAYA KOSA
5. ANANDAMAYA KOSA

A Schematic diagram shown in Fig. 2 indicates Anandamaya Kosa as the inner most and the subtlest. As the sheaths become subtler, the freedom of operation in the living beings increases, the bondage decreases and the bliss associated with it also increases. While in Manomaya Kosa the creative power predominates, in Vignanamaya Kosa it is the power to discern and act in tune with it descriminate. Bliss is emobodied in Anandamaya Kosa, the highest stage of evolution in the manifested existence. It is the subtlest among the 5 sheaths of existence. In his journey towards the Ultimate, Man crosses these sheaths of existence one by one. Through analysis, called 'Panca Kosa Viveka' (Knowing through experience his 5 sheaths of existence) 18 and the associated practices called 'Tapas' man transforms himself by gradually getting relieved from the bondages and constrictions of each sheath. This is one of the methods of reaching the ultimate goat enumerated and described in the Upanisats.

4. THE SCIENCE OF ILLNESSES

In Anandamaya Kosa a man is the healthiest with a perfect harmony and balance of all his faculties. At Vignanamaya Kosa there are movements, but are channelised in the right direction. As such, it is in the Manomaya level that imbalances start, gay the Yoga texts (See Appendix 1).[9] Likes and dislikes have come to play at this level. These imbalances amplify themselves resulting in mental illnesses called 'Adhis'. At this stage there are no symptoms at the physical level. Prompted by the perceptual growth of desires, these mental diseases congeal., in us, they begin to manifest themselves externally. Gradually they percolate to the physical frame. Preponderance of Ajnana, (ignorance about his real state of bliss) leads him to perform wrong actions as the eating of unwholesome food, living in unhealthy dwelling, doing things at untimely hours, injuries inflicted, association with the wicked, evil thoughts etc. These breed physical diseases called Vyadhis or the secondary diseases.

The Adhis (primary diseases) are two fold-Samanya (ordinary) and Sara (the essential). The former includes the diseases incidental to the body while the latter the rebirth to which men are subject. The Samanya are normally produced during the interactions with the world. These may be termed as psychosomatic ailments. When dealt with suitable techniques and congenial atmosphere, Adhis of this ordinary type will vanish. Along with it are destroyed the physical

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* The ambitions of the microbiologists when gene was recognised as the smallest unit Of life wore aptly presented in one of the best seller popular magazines in USA thus :
USA : 1975 . Creation of test tube babies   1980 : Control of Sex in babies
1985 : Recognition of qualitiesin babies   1990 : Controlling the same
2000 : Birth of the genius !
What would happen if many Hitlers are born? ' the best-soller cautioned the micro- biologists !

*. Standard International code is used to transliterate Sanskrit words and lines.

ailments, Vyadhis, caused by these Adhis (Adhijah Vyadha- yah). The subtler Adhis of the essential type, 'Sara' which cause the birth of the physical body can be destroyed only by the Realization of the causal states of mind and a corresponding ability to live in Vijnanamaya and Anandamaya Kosas. In that case, man transcends the cycles of birth and death.

This concept of Vyadhis caused by Adhis is summarised schematically in Figure 3. The figure also depicts the second, class of ailments - Anadhijah Vyadhayah - those not originated by mind. These would probably include the infectious and contageous diseases. Through the conventional medicines (the chemotherapy of modern medicine can come under this heading), Mantras (with their natural vibrational characteristics) and good actions (bringing about the purity of mind, the bliss developing in the body, the Prana flowing freely and the food getting digested and assimilated properly) the diseases will get vanished.

THE PSYCHOSOMATIC ILLNESSES

Among the two types of Adhis, described in the previous section, the Samanya (ordinary) type corresponds to the modern psychosomatic ailments. The details as to the genesis and destruction of these psychosomatic ailments are presented in the second portion of Appendix 1. (Sloka 15 onwards).

When the Mind is agitated during our interactions with the world at large, the physical body also follows its wake. These agitations cause violent fluctuations in the flow of Prana in the Nadis. The Prana Rows in wrong paths flying from one to other without rhythm and harmony. The Nadis can no more, in this condition, maintain stability and steadiness, but quiver. Due to these disturbances in the Prana and unsteadiness in the Nadis, the food does not get properly digested. There arises KUJIRNATVAM (wrong digestion) AJIRNATVAM (Non digestion) and ATIJIRNATVAM (Over Digestion).

When this improperly digested food settles down in the body amidst such commotion, it results in ailments of the psychosomatic type. This process of Adhi becoming Vyadhi is shown schematically in Figure 4. Contained in this process of generation of psychosomatic ailments is the method for treating such ailments.

6. THE INTEGRATED APPROACH

Referring to the schematic in Figure 2, we can now see that the disturbances in the MANOMAYA KOSA percolates into the physical sheath (Annamaya Kosa) through the Pranamaya Kosa. Hence, in the treatment of these psychosomatic ailments it becomes mandatory to work in all these levels of our existence to bring about the quickest results. The integrated approach, thus consists in not only dealing with physical sheath, the relief of which could at best be temporary (as is happening with the drugs used in modern medicine to treat diseases of the psychosomatic type like Asthma, Diabetes Mellitus, Hyper-tension, etc.) but also using techniques to When this improperly digested food settles down in the body amidst such commotion, it results in ailments of the psychosomatic type. This process of Adhi becoming Vyadhi is shown schematically in Figure 4. Contained in this process of generation of psychosomatic ailments is the method for treating such ailments.

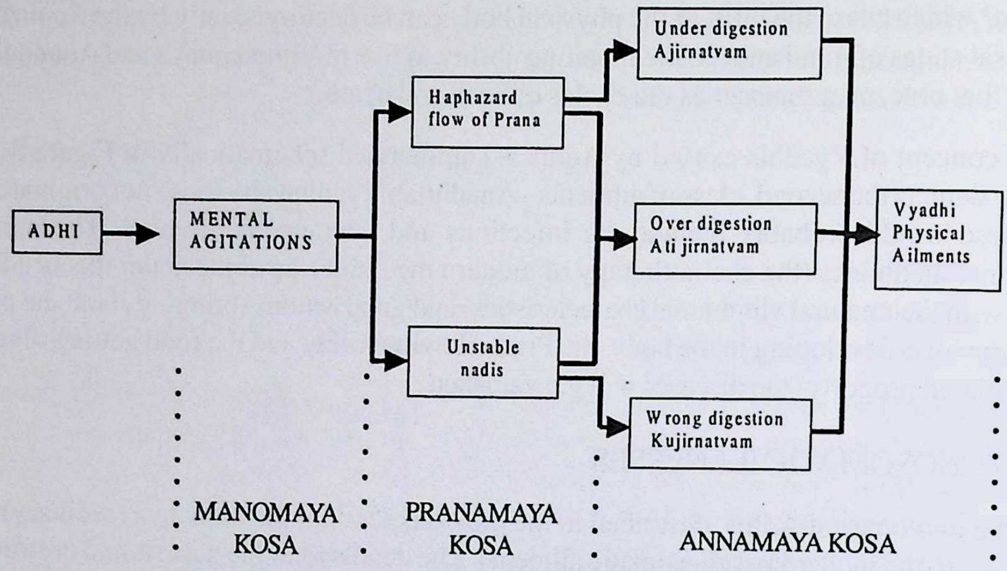

ADHI
MENTAL AGITATIONS
Haphazard flow of Prana
Unstable nadis
Under digestion Ajirnatvam
Over digestion Ati jirnatvam
Wrong digestion Kujirnatvam
Vyadhi Physical Ailments
MANOMAYA KOSA
PRANAMAYA KOSA
ANNAMAYA KOSA

Figure 4. The Science of Psychosomatic Ailments

A) ANNAMAYA KOSA (The physical Sheath)

The physical movements and Yogasanas are used to operate at the Annamaya Kosa level and to remove the physical symptoms of the ailments.

i) Kriyas are Yogic processes described in Hatha Yoga to cleanse the inner organs of our body. they bring about the follwing effects.[28,23]

a) Activating and revitalising the organs.

b) Toning up their functions

c) Desensitization and

d) Development of deep internal awareness. Among the major Kriyas enumerated in the texts on Yoga [20,23], simplified versions of few Kriyas [20] like catheter Neti, Jala Neti, Kapala bhati, Agnisara, Vaman Dhouti (Kunjal Kriya) etc. are used extensively.

ii) Physical exercises and Movement

Very simple physical movements to mobilise and activate particularly affected parts of the body are used. Some easy physical exercises are adopted[26] to fulfil the needs of the particular ailments to:

a) loosen the joints

b) stretch and relax the muscles

c) improve the forebearence power and

d) develop stamina

iii) Yogasanas

Yogasanas are physical postures of ten iminationg the natural positions of the animals meant to tranquil the mind. Through these postures are brought the physical revitalization and deep relaxation, and mental calmness. Appendix 2 details out the characteristic of Yogasanas, clearly distinguishing them form physical exercises.

B) PRANAMAYA KOSA (The Sheath of Prana)

Prana is the basic life principle. Pranayama is a process for gaining control over Prana. Appendix 3 describes the 5 manifestations of Prana in the human system as depicted in Prasnopanisat [18A] and the corresponding most comprehensive definition of Pranayama. Also the conventional Pranayama through regulation of breath is described therein. differences between normal breathing. Kriy and Pranayama are clearly depicted.

Through the practice of proper breathing, Kriyas and Pranayama, we start operating on the Pranayama, we start operation on the Pranayama, we start operating on the Pranamaya Kosa. Suitable types of pranayama and breathing help to remove the random agitations in Pranic flows in the Pranamaya Kosa. Thus, the ailments are handled at this pranamaya Kosa level.

C) MANOMAYA KOSA

A direct operation on this level is made possible by the last 3 limbs of Astanga Yoga of Patanjali[17A] -Dharana, Dhyana and Samadhi. The culturing of mind is accomplished by focussing of the mind (Dharana) initially and followed by relaxed dwelling of the mind in a single thought(Dhyana) for longer and longer durations leading ultimately to super consciousness (Samadhi). A progressive habituation allows the mind to remain relaxed during the period of meditation (Dhyana). The benefits of Transcendental Meditation, a simple standardised technique are numerous, interesting and noteworthy.[1,3] Its application to treat many psychosomatic ailments has become popular. [1,3,5,8]

We use the Yoga techniques to control our emotions. A devotional session containing Prayers, Chants, Bhajans, Namavalis, Dhuns, Stotras etc., help to build a congenial atmosphere to evoke, recognise, attenuate and dissipate the emotions. Thus, control over emotions is obtained through the devotional session. The emotional imbalances and upsurges are eliminated by such control.

D)VIJNANAMAYA KOSA

A basic understanding is the key to operate from Vijnanamaya Kosa. Upanisats are the treasury of such knowledge which is the redeemer of all miseries and obsession. It is the lack of that inner Jnana which is responsible for many wrong habits, agitations etc. The Happiness Analysis-Ananda Mimamsa of the Taitteriya Upanisat handles the most fundamental problem relevent to all living creatures. The analysis, systematically leads the reader to that substratum from which Prana and mind emerges the Ananda Maya Kosa. It helps the person to change his attitude of greed and deep attachment to material possessions and enjoyments towards the realisation that happiness is within and 'each one of us' in our causal state is 'Ananda' embodied. [5.14] As a result, man's outlook in life changes. Knowledge burns the strong attachments, obsessions, likes and dislikes which are the basic reasons for the agitations of mind. The Sara type of Adhis can only be removed by this knowledge (Atma-Jnana or Self-Realisation). [14]

This integrated approach is being used in our Yoga Therapy and Research Centres at Kanyakumari and Bangalore. The participants of these Yoga Therapy courses are exposed to the various dimensions of human evolution as outlined above. Our earlier report No.VKYTRC /

001/ KK/80 summarised the results of our work on various psychosomatic ailments like Bronchial Asthma, Diabetes Mellitus, Hypertension and cardiac problems, Digestive disorders etc. Future reports which are now in offing deal with our more systematic and detailed work connected with the above ailments.

7. SUMMARY & CONCLUSIONS

1. This report presents the basis of an Integral Approach used in the treatment of psychosomatic ailments posing a challenge to the modern medical world.

2. The approach has deep roots in Upanisats and texts on Yoga.

3. A classification of ailments and the science of illnesses as portrayed in Yogic text is presented.

4. Originating at the Manomaya Kosa level, the 3rd among the 5 sheaths of our existence., the agitations of mind cause imbalances and disturbances in the Pranamaya Kosa level. Due to the disturbed Pranic flows and unstable 'Nadis', the channels of Prana do not allow the food to be digested properly. Over digestion, under digestion and wrong digestion bring about physical symptoms at the grossest ANNAMAYA KOSA level. This is the genesis of psychosomatic ailments.

5. Operating on all these Kosas to restore the balance is the method for handling these complex ailments.

6. Yogic practices at the Annamaya Kosa level include Kriyas, physical movements, and exercises and Yogasanas. To restore the balance in the PRANAMAYA K0SA level, we use breathing and Pranamamaya. Operation at MANOMAYA level by Dharana, Dhyana and Samadhi (the direct method of controlling the mind- the ANTARANGA YOGA OF PATANJALI), coupled with Devotional session (to control the emotions and over come the emotional imbalances and upsurges). Knowledge about the ailments and their genesis by AJNANA and wrong direction in our interactions with the world, as postulated in Upanisats (by Ananda Mimamsa - Happiness Analysis) help to operate at VIJNANAMAYA level, leading to the healthiest state of bliss, ANANDAMAYA KOSA.

APPENDIX- 1

This English translation is extracted from Yoga Vasishta

Rama interposed and said: Please enlighten me as to the origin and destruction of mental and bodily disease. In answer to this Vasistha continued: The pains that afflict the body are called the secondary diseases, whilst the Vasana-s that affect the mind are termed mental or primary diseases. We have reached our present state through the absence of the transcendental Jnana, want of mastery over our sense-organs and the perpetual growth or desire and egoism in the mind and our delusion becomes intensified in us by forgetting the degradation of state through such causes. With the growth of such delusion, the mental disease also congeals in us like the snows of winter. When the intense desires of a person begin to manifest themselves externally and the Ajnana in him preponderates, he performs fearful Karmas and these in their turn breed bodily diseases. The body is further subject to diseases through such actions as the eating of unwholesome food, living in unhealthy sorroundings, doing things at unreasonable hours, injuries inflicted, association with the wicked, longing after improper things, evil desires, bad thoughts, the distention and contraction of the orifices of the Nadi-s in the joints, etc. and the interrupted flow of the beneficial

Pranas throughout the body these cause the body to wither. These flourish in the form of diseases in the body, waxing and waning like the flood in a river during the different seasons. The body attracts the effects to itself according to the nature of its countless affinities, good or bad, whether in previous births or in the present one., Thus we see diseases, primary and secondary, arise through the fivefold Bhuta-s (elements).

Now listen, Oh Rama, to the manner in which the two forms of disease, primary and secondary, are destroyed in two ways. The wise say that primary disease, has two Subdivisions: samanya (ordinary) and sara (essential). The former includes the diseases incidental to the body, while the latter the rebirth to which men are subject. If the diseases which afflict this body return to their primal then they are destroyed. Their primary causes being (bad) thoughts, if these thoughts are destroyed, all bodily diseases will vanish. But the disease of rebirth, coming under the head of Sara, will never go except through Atma-jnana. Is it possible to suppose that the misapprehension of a serpent in a rope can be removed except through the discovery of the real rope? But those grievous diseases of the body which do not arise through the original cause can be extirpated by mantra-s, medicine and the many means used by men well versed in medical lore. I need not expatiate upon this subject any further here.

Here Rama asked Vasistha how mental diseases arise and how they are destroyed. Vasistha proceeded: When the Manas is agitated, then this body also follows in its wake. And when the body is agitated, then there is no proper perception of the things that are in one's way and Prana flies from its even path onto a bad road, staggering like an animal wounded by an arrow. Through such agitation, Prana, instead of pervading the whole body steadily and equally, vibrates everywhere at an unequal rate. Therefore the Nadi-s do not maintain a steady position, but quiver. Then the body which is the receptacle of food digested partially or completely, the Nadi-s are simply death, because of the fluctuation of the Prana-s. The food which settles down in this body amidst such commotion is transformed into incurable diseases. Thus through the primary cause (of the mind) the disease of body is generated. If this primary cause be annihilated at its root then all diseases will be destroyed. Now hear of the path by which diseases may be removed by the uttering of Mantra-s. Like base gold which, when placed in the crucible, is transmuted through alchemical processes into pure gold, the mind is rendered unfailingly pure through true, virtuous and pure actions and by serving the wise. In the mind purified thus there is unalloyed bliss. Is not the whole world exhilarated with joy when the soft and delicious moon begins to shed its silvery light? If the mind becomes purified with true Sattva guna, then Prana-Vayu will begin to circulate freely throughout the body, the food taken will be digested properly and hence no diseases will arise. I have thus described to you the path by which the two kinds of diseases can be destroyed.

APPENDIX-2

Physical Exercises & Yogasanas

Operation at the Annamaya Kosa level involves the use of physical movements, exercises and Yogic Postures. The first two are called Sithilikarana Vyayama.

(A.I) SITHILIKARANA VYAYAMA [20]

Before we take up the practice of Asanas we have to prepare ourselves thoroughly so that, the performance becomes easy as well as effective. Asanas involve articulation and bending. Generally the joints are stiff and the muscles are tight, and the preparation is meant for loosening the joints and stretching so that the bending and articulation becomes easy.

Sithilikarana Vyayama or the stretching and loosening exercises aim at such a preparation. These exercises are physical exercises, where predominantly bendings and stretchings are involved. A breathing pattern is also suggested for effectiveness. It is generally observed that if the practice of asanas is taken up directly, there develops pain in the body. This pain is also avoided by doing the Sithilikarana Vyayama. Though this Vyayama is at the physical level if we incorporate the relaxation in action it can be made highly beneficial. They bring about

(i) Mobility of joints & flexibility of muscles.

(ii) Develop physical stamina.

(A.II) PHYSICAL EXERCISES AND YOGIC PRACTICES

From times Immemorial man is trying to be free from disease, to make his body handsome, to make it strong and ultimately make it immortal. The search for the fulfilment of these desires brought about the development of physical culture where various types of exercises are employed. The following is the broad classification of the various types of exercises that are in vogue today. Exercise can be broadly classified in to two types (A) Passive and (B) Active. Under Passive type we have Massage and manipulation of muscles by others, where the beneficiary is passive. Whereas in the active type we have exercises emphasizing on different characteristics, which are enumerated below.

Strength: Body building and weight lifting utilizing the impliments like bar- bells, dumb-bells and also vigorous exercises like pull ups and push ups etc.

Speed: Sports and athletics, etc,

Dexterity: Acrobatics, gymnastics, archery, fencing, lathi, boxing, etc.

Endurance: Under this category there are two subdivisions, namely these for Health and Hygiene- in which there are further subdivisions namely Yogic, and Non-yogic involving practices of isometric type. The other is for Recreation in which walking, hiking, swimming, games etc.

In the above classification for the purpose of getting the benefit from the course we can get common features involved in all Non-yogic type of exercises. They involve speed, jerks and repetition. They are energy expending processes, working in the muscular and circulatory levels. The attitude of competetion, showmanship and materialistic gain often developes tensions etc. Physiotherapy predominantly adopts these physical exercises and movements to treat several ailments connected with muscles, joints and nerves.

The mode of performing yogasanas differ from expert to expert. Looking at large, we can classify the systems of yogasanas into 2 categories:

(i) Dynamic Asanas.

This has transformation in the structure of the body as aim. As the name implies, the characteristics of this system of Yogasanas are speed and repetition. All the asanas involve the articulation of the spine-forward, backward lateral as well as twist. While the physical exercises (Non-Yogic) are effective on muscular and circulatory as well as respiratory systems, the Yogic exercises have an effect on nervous and glandular systems as well. The Dynamic Yogasanas stimulate the nervous and glandular systems resulting in evocation of energy. This energy combats laziness by shattering Tamas and gives rise to Rajas (activity). This particular system is recommended for children as well as people who are lethargic. The Suryanamaskar and Sithilikarana Vyayama can be included in this system of dynamic yogasanas as it is a combination of different asanas, and involves speed. The practice is accompanied by Yamas (Restraints) and Niyamas (Observations).

(ii) Yogasanas of the second type: Relaxing Asanas.

The aim of this system is to develop an inner awareness and unfold the higher levels of consciousness. Continuity in movement, that is, without jerks slowness and maintenance characterise this system. This results in strength and forbearance-Titiksa. There is also a proportionate growth of the body. The control of food and other Yamas and Niyamas are the companions of this system. While the non-yogic exercises and dynamic Yogasanas effect in expenditure of energy and perspiration, the Yogasanas based on Pantanjali's Aphorisms result in deep relaxation and energy conservation, resulting in freshness. This is basically a nerve culture as it calms down the nerves.

(B) STAGES IN YOGASANAS

Most people are of the opinion that Yogasanas are meant for keeping the body fit and healthy. In other words they limit the asanas to physical exercises. It is just like going to a millonaire and asking for a rupee.

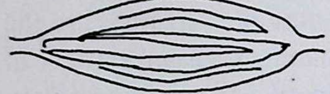
'Asanas' forms one 'anga' or limb of Pantanjali's eight limbed Yoga. This means that he has introduced it with a specific purpose of utilizing the body of which most of us are aware to develop an inner awareness and thus reach higher consciousness. We saw in the earlier discussion that Yogasanas help us to develop forbearance because of maintenance. While maintaining we go through three stages which are described below.

Initially, the posture is shaky. A beginner cannot reach the final posture immediately. After gradual practice he reaches and achieves steadiness and this stage is called 'Sthira'. In this stage, however he is not able to maintain it for the prescribed length of time due to the effort involved. When he withdraws the effort by relaxation as per the suggestion of Patanjali [22] in the first half of Aphorism. II- 47 "Prayatna-Saithilya", he reaches the stage 'Cira' in which he is able to maintain it for the prescribed length of time. The mind control begins here. In 'Sthira' the mind gets concentrated on the process of being in the final posture, but as the posture becomes effortless and natural the mind according to its nature starts wandering. To avoid this, Patanjali gives us a method in the next half of the same Sutra (11-47) "Ananta-Samapatti" or contemplation on the infinite. Here the word 'Ananta' can be interpreted as the chosen deity, or the chosen sound (Mantra) or just expansiveness. When this is done the mind calms down and as it stays in silence it starts experencing the bliss and this stage is called as 'Sukha'. Patanjali defines the nature of Asana in the previous Sutra (11-46) viz: "Sthira -Sukham asanam"-Posture(should be) steady and comfortable. The Sukha stage is comparable to Dhyana. If the posture is 'Sukha' for an appreciably long time subjectively varient the person enters 'Asana-Siddhi' which is the superconscious state or 'Samadhi'. This is given by the subsequent sutra (11- 48) "tato dvandvanabhighath". From that (mastery of the posture) no assaults from the pairs of opposites. This is how we derive infinitely more than just the physical benefits.

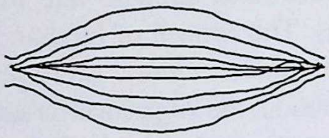
(C) AN IDEAL HEALTHY BODY

All the attempts of Kamsa to kill Krishna have failed. He hits upon a brilliant plan of which he is sure of success. He hosts a carnival of fun and games to which he invites all people including Krishna as well as Balarama. The obstacles are cleverly spaced from the main gate onwards. A rogue elephant attacks Krsna and he kills it. Finally, the court wrestler Canura challenges Krsna and the wrestling bout is very beautifully described in Srimad Bhagavat.

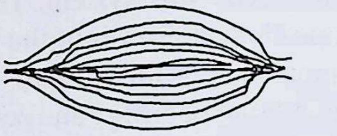
Canura is described as 'man-mountain' with very heavy body having rippling muscles exhibiting strength in every way. The gestures, facial expressions are also given. He is said to be tense, stiff, straining every muscle with an angry face. Contrary to it Krishna's body described in it as well proportioned with a balanced growth, agile, capable of great speed in movements, having good reflexes, highly flexible, Komala-petal soft but stone hard when situation arises, naturally relaxed during action due to lack of strain. His psychology is also very congenial: his face is always smiling as if he is ready for sport, very keen observation due to tranquility of mind and clarity of thought. He keenly observes the 'man-mountain' and notes that he has a slight limp on the right leg due to an injury in a past fight. When the fight begins, Krishna fights effortlessly and wins by using the strength of Canura on himself.



Relaxed muscle



Resting normal muscle



Contrasted muscle

This gives us the characteristics of an ideal body:

1. Balanced and harmonious growth.
2. Great speed in movement due to agility.
3. Highly flexible.
4. Komala-but stone hard when the need arises.
5. Relaxation in action and hence conservation of energy.
6. Tranquillity of mind and clarity of thought. That is the harmony of thought. That is, the harmony of body and mind.

These characteristics can be achieved with the persistent and regular practice of Yogasanas. We shall have to go into some physiological details to understand this.

The normal misconceptions about Prana arise due to partial understanding that Prana is the air entering in and going out; that, which governs breath; that it is nothing but nerve impulses etc. But as we have seen Prana is the basic life principle. In its dormant form, it exists in the mineral world. In the vegetable kingdom, the primary facets of Prana, we can observe, started manifesting. As Prana manifests more and more in the Animal and Human spectrums, newer faculties emerge. The structure of the body is also suitably transformed giving scope to the fuller manifestations of the higher emerging faculties, the mobile limbs and the senses in the animal world and the complex anatomy of the human body. In different parts of the body, different aspects of Prana work with proper co-ordination and organisation between them. In the human system our seers have recognised 5 major facets of Prana carrying on 5 major functions.

There are five different manifestations of Prana in this system. This 'Prana' is called Mukhya Prana (the chief Prana) to distinguish it from its other five manifestations namely Prana, Apana, Samana, Vyana and Udana. They are described in Prasna Upanisat as follows:

Payupasthe Apanam Caksuh Srothre Mukha Nasikabhyam Pranah Swayam Pratisthate Madhye thu Samanah.

"The Apana is in the Organs of excretion and procreation; in the eye and the ear as well as in the mouth and the nose dwells the Prana himself; and in the middle is the Samana."

The manifestation of Chief Prana in the lower regions of the abdomen is termed as Apana. Prana acts in the upper regions-face, nose etc. which essentially corresponds to the force which activates breathing. That which keeps the balance between the upper and lower forces (Prana and Apana) is called Samana. Vyana is defined as:

" Hrdi, Hyesa Atma; Atraitadekasatam

Nadinam Tasam Satam Satamekaikasyah

Dva Saptatih Pratisakha Sahasrani Bhavantyaisu, Vyanascarati".

"In the heart dwells Atman. There are (in the heart) hundred branches in each one of the Nadis, and each of these branch Nadis again has seventy two thousand Nadis. In all these the Vyana moves".

Vyana is that aspect of Chief Prana that flows through each and every Nadi. It co-ordinates the functions of different aspects of Prana.

(D.I) SCHOOLS IN PRANAYAMA.

Normally there are 3 components of Breathing-Inhalation, Exhalation and Stoppage of breath. They are, termed Puraka, Recaka and Kumbhaka respectively. In Kumbhaka the stoppage of breath can occur in 3 ways: after inhalation (Puraka or Antarya Kumbhaka), after exhalation (Recaka or Sunya or Bahya Kumbhaka) and an automatic suspension of breath not due to a proceeding process of breathing (Kevala Kumbhaka). This last variety, Kevala Kumbhaka is the aim of all Pranayamas. In this stage there is no force inside urging us to breathe in or out. A natural suspension of breath is accomplished. This may be induced for a short time by a proceeding Kriya like Kapalabhati due to hyper oxygenation, we get a glimpse of what Kevala Kumbhaka is like. Recognition is half the solution, but it should not end there. We must learn to induce this stage of automatic cessation of breath without the proceeding Kriya. Thus, the real Kevala Kumbhaka is the goal of almost all breathing techniques we are getting acquainted with. There are various effects of this Kevala Kumbhaka- the deep relaxation, lowered metabolic rate, serene blissfulness, expansiveness and single thought, essentially the effects of Dhyana.

The ratio of Puraka, Antarya Kumbhaka, Recaka and Bahya Kumbhaka will be initially 4: 4: 4: 2 (The numbers in the ratio could be taken as Seconds) minimum number of rounds. Gradually as one progresses, the Kumbhaka portion is increased 4: 12: 8: 8, 4: 16: 8: 12, 4: 32: 8:16 etc. As the duration of Kumbhaka is increased more and more, sonic portion of the Kumbhaka will resemble Kevala Kumbhaka. Continued practice leads one to attain Kevala Kumbhaka for a longer duration.

While in the second type, emphasizing the slowness of Recaka and Puraka, no forceful stoppage of breath - Kumbhaka is used. Instead, the time taken for each inhalation and exhalation is made to increase gradually. Associated with it will be the deep relaxation. As one progresses, one finds that an automatic cessation of breath is resulting as illustrated in the figure.

At the change over regions from Recaka to Puraka and Puraka to Recaka, a smoothening takes place resulting in Kevala Kumbhaka.

Associated with the first school, there is the danger of premature energy evocation, Kundalini shooting up without proper overall purification of the system in those who start doing for long durations. It may result in a disaster; neurotics and lunatics may be the outcome. One should work with precaution. The major point, many such wrecks miss, is the use of Bandhas with Kumbhaka- the Jalandhara and Mula Bandhas. If this precaution is taken and a disciplined life is followed, one could use this school with no dangers.

We have chosen the second, safe path. Relaxation, resulting from slowing down of breath is the key. Both schools have the same aim, but the second involves lesser violent changes. It is smooth. Hence, you can notice, that in all the Pranayamas, we are not using Kumbhaka at all. But we would allow the automatic suspension of breath whenever it occurs. In fact, we should welcome it. Glimpses of Kevala Kumbhaka should be instilled in each and every Pranayama. That is the key. After prolonged practice of this method we proceed to introduce 'Kumbhaka' in the Pranayama in the follow-up Camps.

" Athaikayordhvam Udanah
Punyena Punyam lokam Nayati
papena pam, Ubabhydmeva
Manusya lokam"

And then, through one of them (Susumna) the Udana carries (the soul) to the, virtuous World by virtuous deeds, to the sinful World by the sinful acts, and by both to the world of men". And Udana is the one that follows upwards in a subtle passage called Susumna. Normally this, is not known to ordinary people. Pranayama is the science of regulating and gaining control over this Mushy Prana, allowing its fuller manifestations to emerge. But in particular we use regulation of breath to gain control over Prana. Hence, we need to understand the difference between normal breathing (which is normally haphazard, flowing randomly through one or both the nostrils),

Kriya (like Kapala-bhati 20), Yogic full breathing and Pranayama.

(D.II) KRIYAS, BREATHING & PRANAYAMA

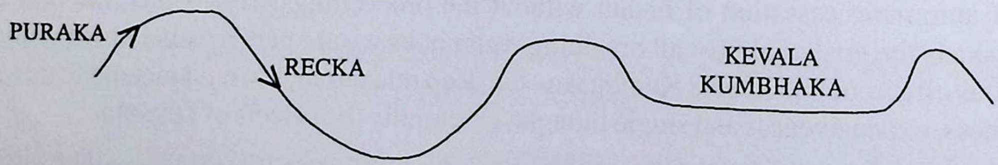


Table below depicts clearly the difference between the Kriyas, Yogic full breathing and Pranayama.

Table depicting the difference between Kriyas, Yogic Full Breathing and Pranayama

Effect	Kriya	Yogic full breathing	Pranayama
1. Breathing rate	About 120/mt. Washing away of CO_2 Increased Oxygen consumption	About 15/mt. Full utilization of correct normal breathing	Less than 5/mt.
2. Muscular	Exercised briskly	Complete Movement of muscles.	Controlled slow movement.
3. Circulation	Greatly Increased, greater concentration of O_2 in blood stream.	Slightly increased. more O_2 gets absorbed.	less than Normal
4. Nervous system	Quick, repetitive nerve impulses, stimulating in effect (Sympathetic chain activated)	Normalised nerve-impulses.	Longer duration Nerve implulses (Sustained Parasympathetic activation)
5. Brain cells	Respiratory centre gets stimulated. It may stimulate other cells also.	Overactivity & under activity normalised.	Cells work with higher CO_2 content. They are kept active with lesser O_2 Consuption.
6. Metabolic rate	Increased greatly. Energy expenditure is more.	Normalised. Proper utilization of energy.	Decreased considerably. Energy conserved Dorment energies are evoked
7. Over all	Shatters Tamas Laziness gone, man becomes active.	Channelised the 'Rajas' Unnecessary wastage of energy is cut. Becomes Healthier.	* Mind moves towards silence. * Potential capabilities are evoked. * Greater efficiency results. * Fresh, Relaxed, Dynamic

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APPLICATIONS OF INTEGRATED APPROACH OF YOGA - A REVIEW

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Abstract: The review paper presents the overall results of the investigations undertaken to examine the efficacy of Yoga Therapy in the treatment and rehabilitation of various stress induced psychosomatic ailments in the psychiatric problems The work covers a period about 5 years. The region investigations encompassed some selected cities of Tamilnadu, Karnataka, Kerala, Andhra, Maharashtra, Gujarat, Uttar Pradesh, Delhi, Bihar and West Bengal. But Bangalore has been selected as the main work base for study and research.

The ailments and the number of patients treated include bronchial asthma, allergic bronchitis and nasal allergy (4230), diabetes mellitus (553) and obesity (7); opthalmic disorders (395) ; hypertension (151) ; and 1. H. D, (30). gastritis, Ulcerative colitis and irritable bowel syndrome (140) , anxiety neurosis, phobias, obsessive illness (109); tension, headache and migraine (83); epilepsy (25); cervical spondylosis (31); rheumatoid arthritis (10) and low backache (123); and other miscellaneous problems like leg pain (15), osteoarthrosis (50), haemorrhoids (piles) (6), chest pain (23), general malaise (35) and mental retardation (20), The clinical investigations and case notes before and after give integrated approach of Yogic training have been recorded. The patients arc also followed up. Statistical analysis of these data is carried out systematically. The results show qualitative and subjective improvements strengthened by & significant beneficial chance & indicated by statistical analysis of the various related clinical and objective parameter.

SECTION I

The new challenge

The past few decades have revolutionised the pattern of life of human beings in the whole world. The growth of civilization has not only solved the basic necessities of life but also brought affluence and comfort to man. However, this age of speed and competition has increased the stresses and strains which man is subjected to. The result-increased ailments of the psychosomatic type posing a new challenge to the modern medical world. To meet the new challenge, the medical researchers have started experimenting with and including in the treatment, the principles and techniques available in various other systems prevalent in different parts of the world. Yoga is prominent amongst these new principles and techniques (G7).

Although Yoga has been used in India over centuries for treating diseases, it has started gaining recognition in the modern medical field as a special line of treatment only over the last decade, Now, there is scientific evidence for the beneficial effects of Yogic practices in some diseases. The common ailments like high blood pressure, diabetes mellitus, bronchial asthma, peptic ulcer, obesity etc., are treatable by Yoga practices. In many such common ailments, stress plays a major role in their causation and / or maintenance,

Meaning of Yoga

The word Yoga in Sanskrit language in derived from the root 'YUJ: Yujyate anena iti yogah'- yoga is union of two things, yoking of one with the other, merger of one with an other entity.

What are these two things? In the technical terminology of Yoga it is a process of merging of 'JIVATMAN' with PARAMATMAN' In common parlance, it simply means that yoga is a process of expansion of an individual personality to cosmic dimensions, making an ordinary man divine.

Sri Aurobindo emphasizes on the alround personality development of man at the physical, mental, intellectual, emotional and spiritual levels. He means by YOGA a methodical effort towards self-perfection. It is a process by which the limitations and imperfections in man will be washed away, transforming him as a super-man (G59). Thus yoga is a systematic process for accelerating the growth of a man at animal level to the level of a normal man, a genius, superman, a divine man and ultimately raising him to the level of Divinity.

Maharshi Patanjali, a great seer (about 800 B. C.) defines Yoga in his second aphorism 'Yogah Citta Vrtti Nirodhah'. Yoga is a (G 82) process of eliminating all the thoughts in the mind. It is a science for mastering the mind. In Yogavasistha, one of the best texts on Yoga, the essence of yoga is portrayed beautifully thus; "MANAH /(G 30): PRASAMANOPAYAH YOGA ITYABHIDHIYATE": Yoga is considered as a skillful process to calm down the mind. It is an "Upayah '', a skillful subtle process and not a brutal mechanical, gross effort to stop the thoughts in the mind. Yoga consists in allowing the mind to settle down to silence, effortlessness is the key. While working, relaxed action is the trick as portrayed in Gita 'YOGAH KARMASU KAUSALAM'.

METHODS OF YOGA

There are a large number of methods of yoga. They are broadly classified into four streams

(A) *Path of Analysis: Jnana Yoga (Philosophy).*

The age of science has made man a rational being. Intellectual sharpness is immanent. Analysis from the tool. The path of philosophy (Jnana yoga) is most apt for the sharp intellectuals. It is centered around the analysis of Happiness, the vital contribution of Upanisads. Also many other fundamental questions regarding life and reality are taken up. In this path, man learns to use the intellect to overcome the intellect and goes to the very basis of intellectual thinking

(B) *Path of Psychic Control - Raja Yoga*

Culturing of mind is the key to success in almost all endeavours in our lives. The Yoga of mind culture (Raja Yoga) gives a practical and easy approach to reach higher states of consciousness. It is based on the Antaranga yoga of Patanjali's Astanga yoga system. The eight limbs of this yoga are:

1. Yama (the disciplines, 'DONTS', 'nisedhas')
2. Niyama (the injunctions. 'DOS', 'vidhis')
3. Asana (the posture of the body)
4. Pranayama (the control of prana, the life-entity)
5. Pratyahara (restraint of senses from their sense object)

These first five limbs come under a general heading "BAHIRANGA YOGA". In this, the 'Bahirindriyas' (the external voluntary sense organs) are used to gain control over the mind indirectly. The last 3 limbs are referred to as Antaranga yoga: here-in the mind is used directly to culture itself. The art of focussing and defocusing the mind is mastered.

(6) Dharana (focussing of Mind)

(7) Dhyana (deconcentration)

(8) Samadhi (super consciousness)

(C) *Control of Emotions: Bhakti Yoga (Devotion)*

The control of emotions is the key to the path of worship (Bhakti yoga). In this modern world, man is tossed up and down in the ocean or emotional conflicts and upsurges The path of Bhakti is a boon to gain control over these emotional instabilities and suppressions by properly harnessing the energy involved in it. by properly harnessing, the energy involved in it. Bhakti Yoga is the science of energy culture to transform the crude forms of uncontrolled emotional energy upsurges to subtle harmonious form of energy (G 35b).

(D) *The path of work: Karma Yoga*

This involves doing action with an attitude of detachment to fruits of action. This makes man release himself from strong attachment & and thereby brings in him a steadiness in mind which verily is Yoga - "Samatwam Yogah Ucyate". The secret of Karma Yoga is to tactfully use just enough energy to accomplish the job. It is the skill of working, in deep relaxation and peaceful awareness (G 45).

Operating on all these kosas to restore the balance is the method for handling these complex ailments. Yogic practices at the Annamaya Kosa level include Kriyas, physical movements and exercises and yogasanas. To restore the balance in the PRANAMAYA KOSA level, we use breathing the Pranamaya. Operating at MANOMAYA level is by DHARANA and DHYANA (the direct method of controlling the mind the ANTARANGA YOGA OF PATANJALI) coupled with Devotional session (to control the emotions and overcome the emotional imbalances and upsurges- the science of BHAKTI YOGA. Knowledge to eradicate all miseries which are basically generated by AJNANA (the ignorance or the wrong approach in our interactions with the world.) as postulated in Upanisads (Ananda Mimamsa - Happiness Analysis) helps to operate at VIJNANAMAYA level, leading to the healthiest state of bliss, ANANDAMAYA KOSA. This multipronged method is termed as the Integrated approach of Yoga Therapy. An extensive literature survey can be found at the end.

Embedded in this comprehensive methodology of Yoga for the alround personality development, ire the techniques needed for improving one's health also the therapeutic applications of Yogi. We will now study the principles of an integrated approach.

The basis for an integrated approach in Yoga therapy.

This integrated approach is derived from the Upanisads and texts on Yoga particularly Taittiriya Upanisad and Yogavasistha. Man's fuller existence including the subtle bodies (depicted as Pranayama, Manomaya, Vijnanamaya and Anandamaya Kosas or sheaths. apart from our gross physical body called as (Annamaya Kosa) has been considered. The Science of illness and the spectrum of Yoga Therapy portrayed in Yoga Vasistha has been reported earlier (A 11a) Originating at the Manomaya Kosa level (as 'Adhis'), the 3rd among the five sheaths of our existence, the agitations of mind cause imbalances and disturbances in the Pranamya Kosa level. The disturbed pranic flows and unstable 'Nadis' (the channels of Prana) do not allow the food to be digested properly. Over digestion, under digestion and wrong digestion bring about physical symptoms in the grossest ANNAMAYA KOSA (Vyadhis). This is the genesis and process of development of psychosomatic ailments.

(A) *Respiratory Ailments*

Patients with chronic respiratory ailments not cured by the usual medical and surgical methods of treatment chose to take up yogic practices. Amongst them were patients with chronic (seasonal and perennial) allergic rhinitis, chronic sinusit is with repeated flare up of headache, chronic bronchial asthmatics with or without emphysematous changes and a small group of patients with chronic bronchitis. (R 13).

Table 1 : Details about our Yoga Therapy Camps and Regular Courses (Facts & Figures)

			In Bangalore No. of patients		Outside Bangalore	
SI. No.	Ailments treated in	Camps classes	inRegular In Camps	Number Group	Age	Total
1.	Bronchial Asthma Bronchitis and Nasal Allergy	1630 (22 Camps)	1800	700 + 100 (Regular +) (12 Camps)	7 - 78	4200
2.	Diabetes Mellitus	153(5 Camps)	280	120 (6 Camps)	12-68	553
3.	Obesity	40	30		18-68	553
4.	Hypertension	19	122	10 (1 Camp)	18-71	151
5.	IHD	13	11	6	32-65	30
6.	Opthalmic Disorders	245(5 Camps)		150 (2 Camps)	5-80	395
7.	Gastro Intestinal Disorders, Gastritis, Ulcers, IBS, Collitis etc.	18	111	11	14-64	140
8.	Anxiety Neurosis	30	79		18-80	109
9.	Tension Headache migraine	3	80		20-60	83
10.	Epilepsy	25			10-60	25
11.	Cervical Spondylosis		31		30-58	31
12.	Arthritis		61		30-80	61
13.	Back pain	7	116		25-70	123
14.	Miscellaneous					
	a. Leg pain Muscular		15		15-70	15
	b. Piles		6		30- 44	6
	c. Chest pain (non cardiac)		23		26-58	23
	d. General Weakness		35		15-46	3
	e. Mental retardation		20		2 - 15	20

In the common monthly meetings of the patients, the practices were checked and corrected, if necessary. Clinical data were recorded in these meetings also. Follow-up camps once a year tailored to the needs of the old patients varied in duration from three days to fifteen days. Clinical data were recorded prior to and during the follow up camp periods.

Follow-up data collection drive also consisted of house visits by research wing personnel and paramedical staff who were well-trained to record the data. It is proposed to continue the follow-up work for a period of ten years. We have so far collected data up to 3 years.

Data on self control and matched control groups without yoga practices are also recorded along with other patients continuing yogic practices.

SECTION II

1. PRESENTATION OF DATA

Now we proceed to present the key data for specific ailments in the following order

A) Respiratory ailments
B) Diabetes Mellitus
C) Cardio Vascular ailments
D) Miscellaneous

A) *Bronchial Asthma*

Patients with established bronchial asthma with or without nasal allergy were selected. They all had either seasonal of perennial episodic attack of airway obstruction (wheezing) with intervals of normal health. Only a few (about 10) of the chronic patients had gone on to emphy sematous changes (all of them starting with episodic asthma) leading to continuous wheezing and breathlessness. The airway obstruction was precipitated by different factors like change of weather, dust, smoke, oil, food, exercise, emotions, or infections. Yoga practices used included the basic set (R11b). Special feature of our camps and yogic training is CHAIR BREATHING technique to deal with the opisodes of airway obstruction (F, 12a).

The data has been presented in two parts

(i) Short term studies
(ii) Long term follow-up studies.

The short term studies consisted of

(a) Data taken on a group of 57 patients with self-control (Table 2.2)
(b) Matched control group data (without yoga) compared with the yoga group with 33 patients (Table 2.3)
(c) Psychological, assessments with Psychosomatic inventory (for about 140 patients) and personality questionnaires for about 25 patients (Table 2.4.1 and 2.4.2).

The follow-up studies consisted of

(1) Data taken on a group followed up for 3 months to 3 years on 680 patients (table 3.1)
(2) Matched control group data (without yoga) compared with the yoga group on 30

patients (Table 3.2). The groups were matched for age, sex, severity of asthma, seasonal / perennial and the date of visits to our out patients clinic.

(B) *Diabetes Mellitus*

Two groups of (50 & 32) patients who had established Diabetes mellitus for 1 to 23 years were treated by regular yogic practices. Their weight, 2 hours post prandial blood sugar in Mgs% urine sugar and medication were recorded before, during and after the yogic practices.

The inpatients were supplied with the calculated diabetic diet from the hospital and the outpatients were advised to change to the required diet pattern if they were not already following the correct dieting schedule. The yogic Practices taught to them are reported elsewhere (D' 4a & 4b).

(C) *Cardio Vascular Diseases*

In this category, Patients suffering from angina and Hypertension get treatment with yogic practices. Rehabilitation of persons who had suffered infarction and angina was also attempted. We now present some more details about the hypertension cases.

Hypetensions

19 patients in the age group of 29 and 52 with established hypertension have been followed tip over a period of 3 months after the initial yoga training One of these patients had steroid induced hypertension and the other belonged to the essential group as established after the complete profile of investigations done by their family physicians, results of which were perused at the time of medical check up at the beginning of the yoga training.

Yogic practices were selected with a view to take them to very deep relaxation. They we're asked not to practice postures which cause strain on the heart. The practices taught are reported in (C 14) while the data and results are presented in Table 5.

Ischaemic Heart Diseases

The group consisted of 13 patients with established angina with hypertension. Of these, 3 cases had suffered myocardial infarctions earlier. The parameters were recorded before and after the yogic training (2 weeks or 1 month). The data and results are presented in Table 6(C 16).

(D) *Miscellaneous*

The data on GI Disorders are presented. In this *group* we have come across 18 patients with hyperacidity, excessive gas formation with hunger pains with or without established peptic ulceration (P. U.). There were a few patients with Irritable Bowel Syndrome (IBS) with symptoms of frequent urge to go to the toilet with a feeling of incomplete bowel emptying. Most of them had formed stools with frequency worst in the morning before getting out for work, the 3rd or the 4th stool associated with mucous. A few of them had loose stool with mucous and blood.

Results on 20 patients with anxiety neurosis have been reported in (A 13) For the others ailments the data are being collected.

2.1. *Analysis of Data and Results*

In general, the data collected have been statistically analysed by the paired 't' test applied to the differences of the mean values before and after the practices.

In self control and matched control group studies, the paired 1 test are first applied for individual groups and the significance level assessed for the changes in the mean values before and after the duration under consideration. To compare the two groups, differences between the two groups before and after the duration of yogic training are considered. The significance levels by paired ' *t* ' test are calculated using changes in the mean values of these differences.

The results are shown tabulated in Tables 2 and 3 for) Bronchial asthma /Nasal allergy (short and long term follow up studies). Tables 4, 5, 6, and 7 show the results for Diabetes Mellitus, Hypertension, I. H. D. and Anxiety Neurosis.

2.2. Discussion

Respiratory Ailments

(a) The sort studies (15 days to 1 month) without control, with self and matched groups as controls in Table 2.1 to 2.3 show clearly that there is significant beneficial effect as measured by the clinical parameters. Table 2.4 indicate the improvement in the psychological tests; they collaborate with the clinical parametric changes and subjective benefits of well being experienced by the patients. These results go to establish the efficacy of the integrated approach of yoga therapy in dealing with patients suffering from bronchial asthma and nasal allergy during the short term, (R 12b to e)

(b) Results have also been obtained recently using a standard Vitallogroph to include pulmonary functions as parameters in our short term studies. The results agree with the trend shown in PER and other parameters.

(c) The use of CHAIR BREATHING technique (8 steps) (12) in dealing with airway obstructive episodes has started giving new ray of hope to the asthmatics. (R 12a).

(d) Long term results presented in Table 3.1 and with matched control group Table 3.2 clearly collaborate the results obtained by the short term studies. The significant improvements in majority of the parameters seen in these Tables go a long way to establish the efficacy of yoga therapy in the rehabilitation of bronchial asthmatic even on a long term basis. (R 12b).

The possible ways in which yoga may help these persons suffering from nasal allergy and bronchial asthma are as follows

(1) Relaxation

Deep relaxation and calming down of the mind lead to beneficial changes in physiological process as seen by slowing of pulse and respiratory rites, and reduced oxygen consumption (observed by Transcendental Meditation group). The deep rest and calmness experienced by them helps them in solving their psychological conflicts, suppressions and hypersensitivity's which are recognised as triggering factors for bronchospasm. Governance of the mental processes through the practice of calmness and relaxation brings the clarity of thinking and thus provides an opportunity for them to solve their own psychological problems.

Internal Awareness

The calming down of the mind also helps in getting an insights into their psychological conflicts or hypersesitivities. As is the famous saying "Awareness is half the solution to the problem" they learn to work within themselves to reach a state of internal poise. The yoga philosophy taught to these patients in the lecture sessions goes a long way in setting right their psychological notions.

The deep internal awareness developed during the yoga practices may have an influence on the involuntary nervous system. There are studies in which yogis have demonstrated slowing of heart to very low rates, Increase in galvanic skin resistance, etc., all or which point to a distinct possibility of developing control over the involuntary nervous system through yoga. In asthmatics, this internal awareness seems to help them to relax their bronchial muscles. Practice of deep relaxation of the voluntary muscles Gradually trains the involuntary smooth muscles to relax as well. This point has been observed during acute episodes treated through chair breathing exercise in our training programmes. The continuous suggestion of relaxed slow comfortable breathing removes the voluntary muscle effort, abates the panic reaction and in about 20 minutes the bronchospasm also disappears in mild to moderate attacks. (R 12a)

(3) Stamiṇa Building

The development of stamina is another local effect observed in asthmatics. Practice of breathing exercises, pranayama and the systematic breathing during asanas regularises the breathing mechanism, trains the proper use of abdominal and chest muscles and also improves the vital capacity. The local effect observed of breathing exercises in documented by physiotherapists.

Kriyas may have a role in increasing the tolerance of the mucous membrane to the various irritants. Neti kriya exposes the nasal mucous to learn how not to react hypersensitivity to small irritations by dust, smoke, temperature variations, etc. (R 12c).

Drainage

The mechanical effect of drainage of secretion obtained by gravity in various forward, backward and inverted postures may have a role in reducing the airway obstruction and obstruction to the sinuses.

DIABETES MELLITUS

The results in Table 4 indicate a significant improvement in almost all the parameters shown. This group improvement is collaborated by the subjective well being of the patients as well, The significant improvement even in the case of juvenile type of Diabetes Mellitus has attracted our attention for more detailed studies. Concerted efforts are being put to examine such improvement with a critical eye. Also long term patients are in progress (D 4b).

These significant Improvements in the case of Diabetes, we feel, are mainly due to

1. release of stress &
2. reduction in weight by deep relaxation techniques of yoga taught to them during the Programme of treatment.

All these patients, (constant weight cases) (D 4a) have shown reduction in their blood sugar and urine sugar values without any change in their weight. This adds evidence to the special contribution of yoga apart from its exercise effect which helps in weight reduction.

CARDIO VASCULAR AILMENTS

Results in hypertensives and 1. H. D. patients presented in Tables 5 and 6 indicate significant changes in both diastolic and systolic pressures. We also notice reduction in medication. This collaborates with the reduction in many symptoms like insomnia, tensions, anxiety, angina pain and headache as felt by the patients.

The subjective reports by various other patients also have shown continued benefits over months.

It is well known that deep relaxation could be a boon to (CS & 9) hypertensives (25. 26). Savasana interspaced between asanas helped these patients to learn relaxation in different postures as well. They were through conscious habituation, asked to use relaxation during their normal activities and this helped them to find great benefits (C.14).

TABLE 2.1 RESPIRATORY AILMENTS: Self Control Result (2 Weeks results)

SELF CONTROL STUDY

No. of patients studied	57
Male	43
Female	14
Age Group	8 - 75 years
Duration of training	15 days

2.1a Control Group A

	Weight	Severity	NA	Atks/Wk	Med/Wk	PEFR	PR	RR	BHT	CE	BP
N	29	18	47	57	57	57	57	24	57	56	55
t	0.68	2.61	1.17	4.15	2.36	0.07	-0.83	-0.09	0.22	-1.65	93/0.96
p	0.25	0.01	0.156	0.15	0.005	0.01	-0.2	0.4	0.05	0.02	5/0.2

2.1b Yoga Group B

N	26	15	33	56	56	57	55	22	54	53	47
t	-1.73	3.65	4.19	2.62	5.09	2.94	2.45	0.7	-1.25	-2.36	1.93/3.09
p	0.05	0.005	0.005	0.005	0.005	0.005	0.01	0.25	0.4	0.5	0.25/0.05

2.1c Comparison (A - B)

N	25	13	32	54	56	57	57	21	54	54	46
t	1	0.66	2.49	1.98	2.99	1.85	1.62	0.23	0.96	1.69	0.68/2.09
p	0.15	0.25	0.005	0.25	0.005	0.05	0.05	0.4	0.15	0.05	-35/0.025

TABLE 2.2 RESPIRATORY AILMENTS: Matched Control Study (2 Weeks resuts)

MATCHED CONTROL STUDY

No. of patients studied ———— 33
Male ———— 29
Female ———— 4
Age Group ———— 10 - 75

**Group matching done for Age, Sex, Seasonal / Perennial and date of visit*

2.2a Control Group A

	Weight	Severity	NA	Atks/Wk	Med/Wk	PEFR	PR	RR	BHT	CE	BP
N	16	13	30	33	33	33	33	10	33	32	31
t	0.88	1.93	0	2.47	1.32	-0.75	-0.29	1.04	0.06	1.64	2.34/0
p	0.2	0.05	-	0.10	0.1	0.25	0.4	0.15	-	0.05	0.01

2.2b Yoga Group B

	Weight	Severity	NA	Atks/Wk	Med/Wk	PEFR	PR	RR	BHT	CE	BP
N	30	5	30	33	33	32	30	7	7	33	32
t	0.22	6.71	7.5	4.37	4.59	2.83	3.29	2.28	0.24	4.48	1.69/2.26
p	0.4	0.005	0.005	0.005	0.005	0.005	0.005	0.025	0.4	0.005	0.5/0.01

2.2c Comparison (A - B)

	Weight	Severity	NA	Atks/Wk	Med/Wk	PEFR	PR	RR	BHT	CE	BP
N	15	2	28	33	33	32	30	7	8	32	30
t	0.96	1.41	7.41	0.46	3.45	1.87	1.75	2.11	1.98	3.96	0.11/1.64
p	0.2	0.005	0.005	0.35	0.005	0.025	0.05	0.025	0.05	0.005	0.45/0.05

TABLE 2.3 Studies using psychological tests (RESPIRATORY AILMENTS)

Table 2.31 Results from psychosomatic Inventory

	*Part 1		*Part 2		Total of parts 1 & 2	
Details	Pre	Post	Pre	Post	Pre	Post
Total	4513	7206	3277	5098	7790	12304
N	117	117	117	117	117	117
Mean	38.52	61.59	28.009	43.57	66.58	105.16
‘ t ‘	-2.823		-1.559		-2.448	
Significance,	0.005		0.05		0.01	

** *Part 1* — *Physiological disfunction.*

Part 2 — *Psychological maladjustment*

TABLE 2.32 Results from Eysenr’s Personality Inventory for all patients.

	Extroversion		Neuroticism	
	Pre	Post	Pre	Post
Total	14999	1511	1899	1758
N	141	141	141	141
Mean	10.63	10.72	13.47	12.47
Sd.	3.25	3.23	4.61	5.12
‘ t ‘	- 0.233		2.967	
p	Not sig.		0.005	

TABLE 3.1 Long term Follow - up (3 months to 3 years) RESPIRATORY AILMENTS

.	Severity	NA	M /Wk	A /Wk	PEFR	PR	RR	BHT	CE	BP	Duration	No. of months/yr.	Inj / yr.	cartisone/ yr.
N	601	539	556	499	655	664	648	652	654	629	5633	551	207	139
Mean	-0.52	-0.89	-6.4	-27.3	+91.3	23.8	7.6	9.9	2.5	112/84	6.2	4.8	2.3	30.7
‘ t ‘	-10.5	-14.8	-0.4	-7.3	+15.8	7.2	13.7	15.1	8.2	3.8 / 2.5	6.4	11.8	1.8	3.6
p	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.05	0.005

TABLE 3.2 Long Term Controlled Studies (3 months to 3 years)

3.2a Control Group without Yoga(A)

	Weight	Severity	NA	Atks/Wk	Med/Wk	PEFR	PR	RR	BHT	CE	BP
N	23	29	29	29	29	24	21	20	22	24	17
t	1.84	3.59	1.92	2.1	0.4	3.99	1.16	0.45	0.27	3.87	1.71/ 0.16
p	0.05	0.005	0.05	0.025	0.35	0.005	0.15	0.35	0.4	0.005	0.05/0.45

3.2b Matched Yog Group (B)

N	23	29	29	29	29	24	21	20	22	24	17
t	3.58	3.92	5.49	5.98	4.35	5.75	0.55	0.69	3.18	8028	1.71/ 0.58
p	0.005	0.005	0.005	0.005	0.005	0.005	0.3	0.25	0.005	0.005	0.2/ 0.3

Group matched for age, sex, seasonal / perennial, dates of visit & severity

TABLE 4: Studies on Diabetes Mellitus for Total patients.

	Weight in Kgs	2 Hrs. PPBS	Medication Week
N	72	0.005	0.005
t	5.26	4.99	2.56
P	0.005	0.005	0.005

Average Weight in Kgs.

61.35 Kgs.	Before the Camp.
61.66 Kgs.	After the Camp

TABLE 5: Statistical analysis of Hypertensives.

Sl. No.	Details	No. of Patients	Initial	Final	P
1.	Medication (Anti - hypertensive)	19	11.47 ± 12.77	9.31 ± 12.95	0.01
2.	BP Systolic / Diastolic	17	155.1 ± 26.19	131.6 ± 56.5	0.008
			101.47 ± 13.2	99.06 ± 14.83	0.02

TABLE 6 : Statistical analysis of IHD cases

Sl. No.	Details	No. of Patients	Initial	Final	t	p
*1	Medication (Anti hypertensive)	13	6.6 ± 8.9	1.88 ± 3.67	2.94	0.008
2.	B.P. Systolic/	10	126 ± 12.2/	116 ± 22.0/	2.96/	0.008
	Diastolic		85.6 ± 11.96	76 ± 23.51	3.3	0.005

MISCELLANEOUS

a) GI Disorders

The data taken on patients suffering from various gastro intestinal disorders like gastritis, hyper acidity and peptic ulcers, IBS, chronic dysentery and colitis, presented elsewhere indicates beneficial application of integrated approach for GI disorder. Systematic and detailed investigations and study are being initiated to throw more light on the use of yogic practices for GI disorders.

b) Anxiety Neurosis

The data on 20 anxiety neurosis patients carefully selected out of about 45 patients has been collected and the changes on various parameters including bio-chemical data on 24 hrs urine

TABLE 7 Miscellaneous: Anxiety Neurosis

	I FOLLOW -UP (1 month)			II FOLLOW -UP (3month)		
Test Parameters	No. Samples	Mean Difference	Signi-ficance	No. samples	Mean difference	Signi - ficance
G.S.R.	14	+ 100	0.01	12	+ 60	NS
Pulse	18	- 4.(3)	0.05	18	- 4.889	P 0.05
Breath rate	18	- 2.722	0.025	18	- 5.333	P 0.005
BB Systolic	17	- 1.7	NS	18	- 1. (8)	NS
Diastolic			NS			NS
BHT	18	+ 1.5	NS	18	+ 4.611	P 0.025
CE	18	+ 0.466	P 0.025	18	+ 0.8	P 0.01
GHQ	18	- 7.611	P 0.005	18	- 5.88	P 0.05
GAQ(Lichert)	18	- 17.5	P 0.005	18	- 16.55	P 0.005
Max Hailton's	18	- 37.5	P 0.005	18	- 50.381	P 0.005
TC	18	- 358.(8)	P 0.05	18		
DC - P	18	+ 0.278	NS	18	+ 0.(51)	NS
- L	18	+ 1	P 0.25	18	+ 0.22	NS
- M	18	- 0.722	P 0.005	18	- 0.889	P 0.005
- E	18	- 0167	NS	18	- 0.(3)	NS
BLOOD						
Glucose	18	+ 9.278	P 0.01	17	+ 3.882	NS
Urea	18	+ 1.369	P 0.025	18	+ 1.056	NS
Cholinesterase activity in Urine	12	+ 6	P 0.05	11	+ 5.273	NS
Urea	17	- 1.294	NS	17	0	NS
17 - OS	17	- 0.703	NS	18	- 0.304	NS
17 - OGS	17	+ 0.3705	NS	17	+ 3.104	P 9.05
VMA	17	- 0.499	P 0.05	17	- 0.653	P 0.01
Free CA	16	+ 8.187	NS	16	- + 24.6879	NS

samples and blood have been reported in (A13). Except 2 out of the twenty, all patients have been rehabilitated to normalcy. The two are also, improving. The 3 months long study has paved way for detailed long term investigation.

c) *Opthalmic Disorders*

The use of yogic Practices (as a pilot study) on nearly 400 patients with myopia, hypermetropic astigmatism, glaucoma and initial stages of cataract has shown promising trends in the process of rehabilitation. Scientific investigations hive now been started to obtain quantitative result (05).

d) *Mental Retardation*

Feasibility studies on the use of yogic practices on about 25 children for about an year have been completed. Based on the encouraging improvements noticed among these children, we have taken up studies on about 100 children.

e) *Other Ailments*

Miscellaneous ailments shown in Table 1 are also being dealt with in our yoga therapy and research centre at Bangalore. They are in quite a preliminary stage of development. While a general trend of improvement is noticed in many cases, improved methods for specific ailments like migraine, epilepsy, arthritis, spondylosis, etc. are being developed.

SECTION 3. SUMMARY AND CONCLUSIONS

1. This review Paper presents some of the results obtained by statistical analysis of clinical investigations on groups of patients treated by the Integrated Approach of Yoga Therapy.

2. The number of patients treated aggregates to about 6000 over a period of 5 years in various centres of Vivekananda Kendra encompassing Karnataka, Kerala, Tamilnadu. Maharashtra, Andhra, Uttar Pradesh, Delhi, Gujarat. Bihar and West Bengal.

3. The distribution of the patients treated is as follows: Respiratory diseases (4230), Diabetes and Obesity (623), Hypertension and I.H.D. (181), G. I. disorders (140), Anxiety Neurosis and Psychosis (109), Mental Retardation (25), Opthalmic disorders (395) and other miscellaneous ailments (400).

4. The integrated approach of Yoga Therapy consisting of Kriyas, Sithilikarana vyayama (loosening practices), yogasanas, Breathing and Pranayama, Dhyana and devotional sessions, and lectures/discussions, has been administered to these patients spread over 2 weeks (2 ½ hrs. daily) or 4 weeks (1 ¼ hrs./ day).

5. Extensive clinical investigations have been recorded by specialists in the respective fields (doctors and technicians) before and after the yogic training programmes. Often data during the programme also are taken.

6. The patients are being followed up regularly and data obtained once a year. So far data for 3 years have been obtained.

7. All these well documented data have been analysed by group of statisticians and the results have been presented.

8. Data on clinical parameters and results based on statistical analysis are presented for the following ailments :

Bronchial asthma, nasal allergy etc, (680) Diabetes Mellitus (82), Hypertension & IHD (32) Anxiety Neurosis (20) For other diseases, subjective results are recorded.

9. Results of the controlled studies using self control (20 cases) and matched control groups are also presented for 35 (short term) and 30 cases (long term) of respiratory ailments.

10.The results have clearly indicated significant levels of improvements in almost all parameters. These results of the objective parameters and the subjective improvements experienced by patients go to show distinct possibilities of using integrated approach of Yoga Therapy in almost all these cases. Further studies and research will pave way in establishing the efficacy of Yoga Therapy in treating these ailments.

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YOGA IN MEDICINE

BY

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HISTORY

Yoga has its origin in Sankhya philosophy of Indian culture which is about 8000 years old. Upanisads, the essence of Vedas, Bhagavadgita, Patanjali yogasutras, Hatha pradipika, Gheranda samhita and Yoga vasistha are common texts of yoga

WHAT IS YOGA?

Yoga is not only physical postures. The practices like pranayama and meditation are also included under yoga. The word Yoga is derived from the sanskrit verb "Yuj" (to unite) which refers to merging of individual Consciousness with universal Consciousness. Patanjali defines yoga as 'mastery over the modifications of mind-Chitta vritti nirodhah'.

There are four techniques of yoga to achieve this calm state of mind. These are Jnana Yoga - the Path of self analysis, Raja Yoga - the Path of self control, Bhakti Yoga - the path of self surrender and Karma Yoga - the path of self sacrifice (Figure 1.)

There are four major areas of applications of yoga in medicine i.e. Complementary therapy, prevention, rehabilitation and promotion of positive health.

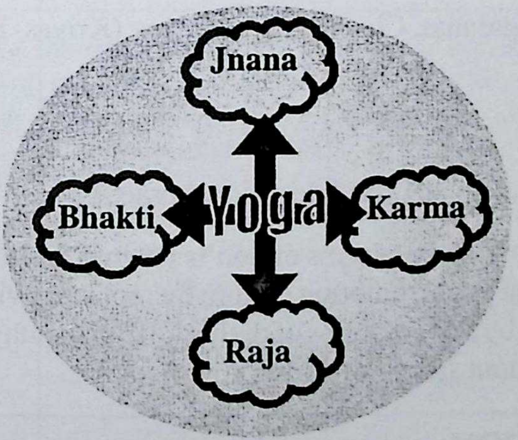


Figure 1

The Raja Yoga also called Astanga Yoga has eight limbs

8. Samadhi	Absorption with object of meditation
7. Dhyana	Defocused, effortless, restful alertness
6. Dharana	Spatial focusing of mind - Meditation
5.Pratyahara	Withdrawl of senses from sense objects
4. Pranayama	Slowing down the breath
3. Asana	Physical postures
2. Niyama	Do's - Moral commitments - cleanliness, cheerfulness, penance, self study and surrender to God
1. Yama	Don'ts - Moral restraints - Non-violence, truthfulness, non-stealing, celibacy, non-acceptance of gifts.

Figure 2

YOGA AS COMPLEMENTARY THERAPY

According to yoga, man is in perfect health and homeostasis at his subtle levels of existence (Causal and bliss body). All diseases are classified as Adhija (stress born diseases) and Anadhija vyadhis (non-stress born diseases - infections, injuries etc.) Yoga is the remedy for stress-born, whereas medicines or surgery along with yoga is the remedy for non-stress-born diseases. The problem of stress begins in the mind. Stress is defined as extremely speeded up rate of flow of thoughts in the mind. This percolates into physical body as disturbed autonomic, endocrine and immune responses. A common holistic module of practices called Integrated Approach of Yoga Therapy (IAYT) that is used in the management of stress born ailments include,

1. Physical practices- Yogasanas, Cleansing techniques (Kriyas- Dhouti and Neti) and simple vegetarian wholesome diet

2. Pranayama

3. Meditation (Dharana, Dhyana), and devotional practices

4. Life style modification - moral norms of don'ts (Yama) and do's (Niyama), Analysis of the nature of happiness(Jnana yoga), emotion culture by replacing violent negative emotions of fear, tension, depression, etc. by soft emotions of divine love, sympathy, pardon etc.(Bhakti yoga), and the trick of working without stresses (Karma yoga).

YOGA IN REHABILITATION

Yoga has been shown to be an adjunct in the rehabilitation of drug abusers, alcoholics, schizophrenics, congenitally blind, emotionally and socially traumatized girls from remand homes and inmates of jails. Children with mild and moderate degree of mental retardation improved in IQ aft er IAYT for one Year.

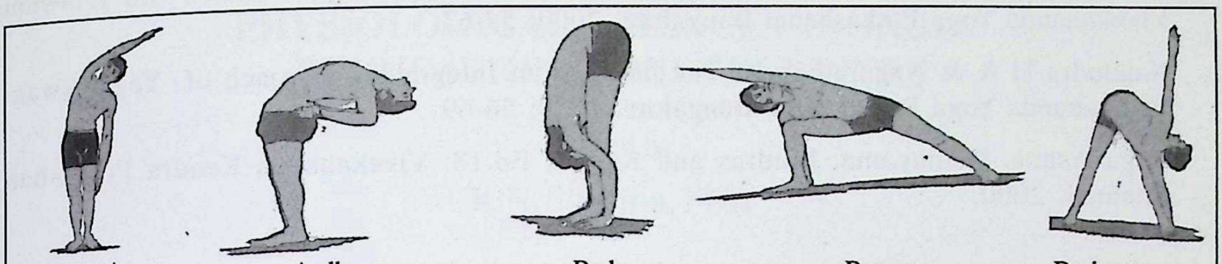
Table 1. Yoga as a complimentary therapy

Diseases	Practices to be avoided	Practices recommended	Mechanism conclusion	Research
Anxiety (General), OCD, Panic disorder, Depression	Meditation > 5 min.	All basic set repeated quickly. Emphasize and Chanting.	All basic set repeated quickly. **Emphasize:** Kapalabahti, Bhastrika and Chanting.	Reduced heart rate, blood pressure. urinary VMA, Max Hamilton's anxiety & Beck's depression.
Asthma	None	IAYT - All basic set. **Emphasize:** Pranayama, Vamana dhouti, jalaneti, Yoga chair breathing.	Voluntary control over involuntary hyper-reactive reactive immune & ANS responses.	80% reduction in medication and symptom scores, improved PFR.
Diabetes with out Retinopaty.	Most asanas and Vigorous breathing practices.	Meditation, DRT - Deep Relaxation Technique, MSRT - Mind Sound Resonance Technique. PET - Pranic Energization Technique	Stress reduction reduced depression better immune stamina, confidence, freedom from fear of death.	Reduced depression scores, reduced side effects of RT & CT improved quality of life.
Diabetes - With out Retinopathy	Yoga mudra, Salabhasana.	IAYT - basic set, **Emphasize:** Ardhamatsyendrasana, Dhanurasana, Sarvangasana.	Control over mind better compliance of diet and exercise, weight reduction, stress reduction	Reduced FBG and PPBG, Glycated Hb, weight reduction, improved peripheral circulation in extremities, reduced OHG requirement.
Hyper tension (essential)	All acute forward and backward bending postures and breath holding pranayama.	Simple asanas, pranayamaDRT, savasana, meditation **Emphasize:** Karmayoga.	Reduced sympathetic tone stress reduction, weight reduction.	Mild hypertensives can keep off medication. Moderate & severe can only reduced medication.
Coronary Heart diseases	------- do-------	------ do------- **Emphasize:** Life style modification IAYT.	Stress reduction, compliance to diet and discipline of life Weight reduction.	Mild hypertensive Coronaries, Reduced Angina, improved quality of life.
Rheumatoid Arthritis, Osteo Arthritis	Painful Practices.	Basic set of IAYT	Improved flexibility, grip strength & general health, stress reduction, delaying of aging.	Reduced symptoms and medication scores better functifunctional capacity.

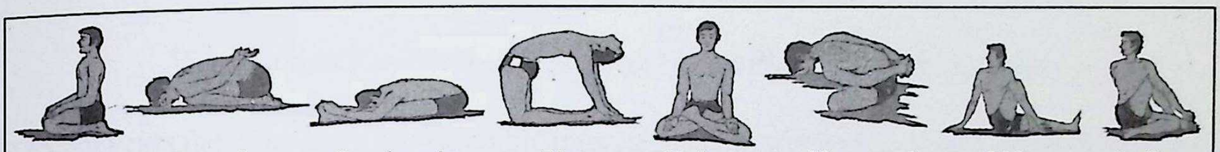
Table 2. Yoga for Promotion of Positive Health

Positive Health	Findings	References
Positive Physical Health	Improved cardio-respiratory functions,better flexibility, muscular efficiency yogic exercises on human physical & endurance after yogasanas for 6 months in National defense acadamy cadets study.	Nayar HS et al., 1975, effect of efficiency: Indian Journal of medical Research, 63:1369 - 1376.
	Improved lung functions, breath holding time. finger dexterity, finger steadiness & autonomic stability after 3 months of yoga training in sports teachers.	Telles S, Nagarathna R, Nagendra HR. and Raghuram NV., 1993, Indian Journal of Medical sciences 47(10): 235 - 238.
PositiveImmune stamina	Reduced Gingival inflammation. 74% improvement in 46 transcendental meditators Vs 15% in 26 non-meditators.	Klemons 1972, in scientific research on transcendental meditation programme pp 287 - 291, eds. DW orme Johnson, JT Farrow, Maharshi. European research university press, west germany 1997 (1)
Positive Mental health	Improved visual perception, momory,right brain memory, eye hand co-ordination, attention span, concentration, reduced anxiety with better emotional stability	Brown DP et al. 1084, Perceptual and motor skill 58: 775-777. Telles S. et al., 1993, Perceptual and motor skills 76: 1264 - 1266. Telles S. et al., 1996, J of alternative and complimentary medicine 2(4): 479 -484.
Positive Social Health	Reduced crime rate in cities where the number of TM meditators reached	Borland C 1976, in scientific research on transcendental meditation programme pp 639 - 648, eds DW Orme Johnson, JT Farrow, Maharshi European Reaserch University press, West Germany 1997 (1)
Positive Spiritual Health	A compassionate, loving, caring, genuine, personality with self - actualization, contentment, peace and joy.	--------do-------- Hielli LA 1974, pp 437 - 441. Davies J et al. 1974, pp 449 - 452.

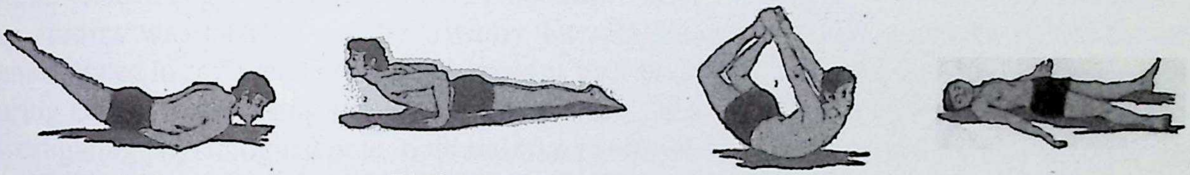
Basic set of Yoga practices of Integrated approach of Yoga Therapy



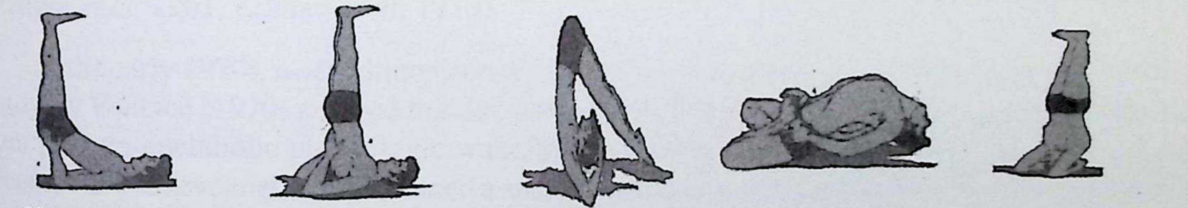
Ardhakati Cakrasana
Ardha Cakrasana
Pada Hastasana
Parswa Konasana
Parivrtta Trikonasana



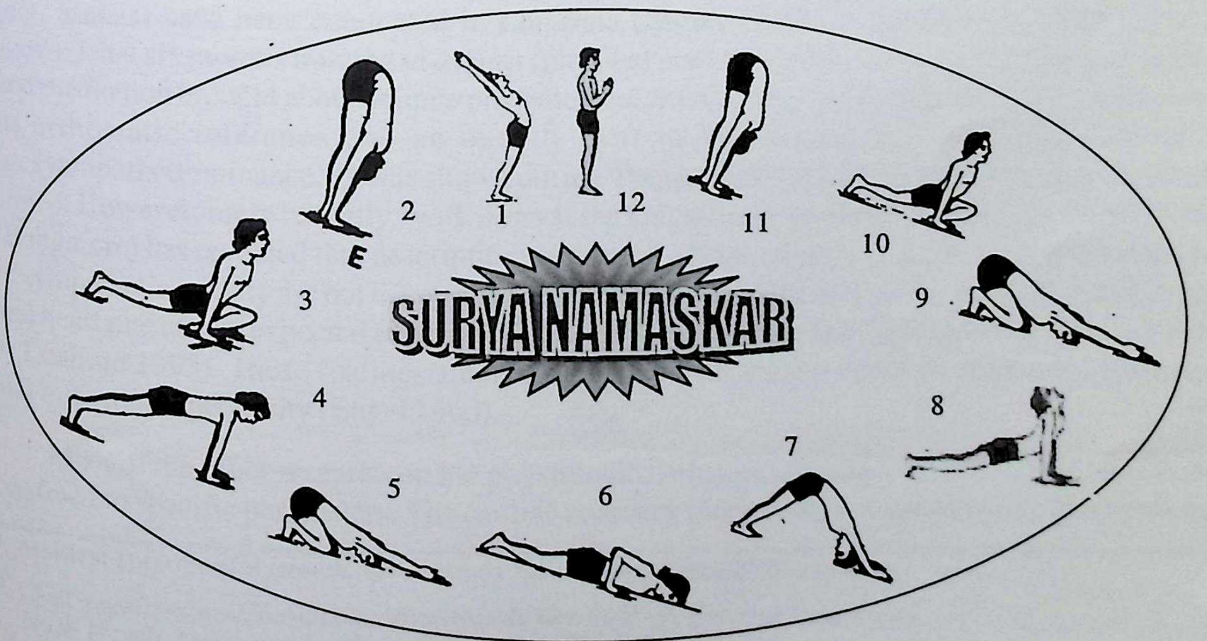
Vajra
Sasank
Pascimatina
Ustra
Padma
Yogamudra
Vakra
Ardha



Salabhasana
Bhujangasana
Dhanurasana
Savasana



Viparita Karani
Sarvangasana
Halasana
Matsyasana
Srisasana



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PHYSIOLOGICAL SCIENCES IN INDIA: FOUNDATIONS AND FRONTIERS

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RESEARCH ON YOGA

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In recent years there has been considerable interest in scientific research on yoga in India and in the West. However, it is heartening as well as interesting that the earliest research on this ancient Indian science began in Lonavala (Maharashtra). The meticulous work which also involved X-ray studies was carried out by Swamy Kuvalayananda (Kuvalayananda 1925a,b), who demonstrated intravisceral pressure changes as well as shifts in the relative positions of the viscera during *kriyas* or cleansing procedures. After this, for a while yoga research was focussed on investigating physiological potentials and some unusual claims of yogis being able to lower their metabolism (Anand *et al.* 1961a), to shut off sensory stimuli while meditating (Anand *et al.* 1961b), and their ability to alter their cardiovascular functions at will (Anand *et al.* 1961 c, Wenger *et al.* 1961, Kothari *et al.* 1973).

In the early 1970s, a new dimension was given to research on yoga when the epoch- making study by Wallace (1970) showed that the practice of Transcendental Meditation brings about a "unique hypometabolic physiologic wakeful state" with overall signs of psychophysiological relaxation. The seventies also witnessed a spate of research work conducted in various laboratories of India primarily directed to study the variety of physiological changes occurring in common man during yogic practices. Detailed experiments on the physiologic effects of diverse practices (e.g. asanas) have been conducted in Lonavala (Bhole 1970). A study from DIPAS (Delhi) showed that six months training in *asanas* (physical postures), *pranayama* (breathing practices), and meditation brought about definite physiological changes in normal volunteers, viz. an increase in orthostatic tolerance and an overall shift in the autonomic equilibrium towards prasyampathodominance, as was shown during Transcendental Meditation (Selvamurthy *et al.* 1983). However, more recently, work done at the Department of Neurophysiology, NIMHANS (Bangalore) has revealed that descriptions of overall effects of yoga practice such as a reduction of sympathetic activity are not to be expected. Different variables such as the pulse, skin resistance and heart rate can be expected to change differently when the same subject practises yoga (Telles & Desiraju 1993). These findings are in accordance with known views of autonomic response and individual specificity (Engel 1960).

Most of the other research on the physiological changes during yogic practices have been confined to specific parameters. The cardiac recovery index (CRI) assessed by the Harvard step test was shown to increase after 2 ½ months of yoga training (Muralidhara & Ranganathan 1982). Six months of yogic *asanas* were also shown to increase hip and shoulder flexibility in the middle-aged men whereas physical exercises had no such effect *(Ray et al.* 1983). Nayar *et al. (1975)* demonstrated improvement in cardiorespiratory functions in NDA cadets trained in yogic practice as compared to those undergoing physical training. The body flexibility and the muscular efficiency improved after six months of yoga training (Ray *et al.* 1986). The improvement in muscular efficiency was reflected as an increase in endurance time probably due to alternate recruitment of motor units. Besides, yogic practice could result in a significant improvement in physiological responses to acute cold exposure by facilitating the process of non-shivering thermogenesis (Selvamurthy *et al* 1988). Yogic practices have also been found useful in improving biological markers of ageing. Aroor and co-workers (Aroor *et al* 1990) reported significant increase in cardiac efficiency index, vital capacity, Creatinine Clearance, decrease in blood glucose and urinary excretion of catecholamines after one month of yogic practices. Reports of energy expenditure and ventilator responses to *siddhasana* have shown greater minute ventilation, larger tidal volume, higher 0_2 consumption, greater $C0_2$ elimination, and higher heart rate in sitting posture as compared to horizontal-supine and chair-sitting postures (Rai *et* al. 1994). The results suggest that *siddhasana* is a mild type of exercise and may have its applications in conditions of low cardiorespiratory reserves particularly in individuals in whom heavy exercises are contra-indicated.

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There has also been considerable research work on biochemical changes during yogic practices. The studies conducted at the Banaras Hindu University (Varanasi), showed that Six months of yoga practice increased 17-hydroxycorticosteroid excretion, reduced serum cholesterol, blood sugar and increased serum proteins (Udupa 1972, 1985). These findings (specially the increased adrenocortical activity) were interpreted as increased stress competency. Later at DIPAS Santha *et al.* (1981) described the biochemical changes indicating a relative hypometabolic state along with reduction in sympathetic activity. Investigating the role of sahajyoga in stress, Rai and his colleagues (Rai *et al.* 1989) studied blood lactic acid, urinary vinyl manddic acid, blood pressure, heart rate and respiratory rate in subjects trained in sahajyoga, and observed a significant decrease in these parameters. Galvanic skin resistance, on the other hand, significantly increased, indicating a state of relaxation.

The long-term practice of Transcendental Meditation was shown to alter pituitary hormones (e.g. TSH, LH) and cortisol responsiveness to LH-RH and insulin, respectively (Ahuja *et al. 1981).* A report (Sahay *et al.* 1982) from the Vemana Yoga Research Institute (Secunderbad) showed an increase in creatine phosphokinase and reduced pyruvate to lactate ratio following 3 months of yoga practice.

When these studies on the physiology of yoga were being carried out, research efforts were also directed to assess the therapeutic potentials of yogic practice in stress- related, psychosomatic ailments, particularly hypertension, hyperthyroidism, ischaemic heart disease, acid peptic disease and ulcerative colitis (Udupa 1976). Though Datey and his co-workers (1969) and Patel (1973, 1975) had reported their observations regarding beneficial role of yogic practices particularly *shavasan* in hypertension as early as in 70s, it is only recently that role of yoga specially *pranayama* (voluntarily regulated breathing including a period of breath-holding), meditation, *shavasan and* sahaj yoga have been extensively investigated in different stress-related cardiovascular disorders (Swain & Das, 1994, Sachdeva *et al* 1994, Talukdar 1994). In an open study comprising 23 hypertensive patients, Sachdeva *et al (1994)* observed reduction in systolic blood pressure from 134.5 ± 16.01 mm Hg to 125.1 ± 9.88 mm Hg and diastolic blood pressure from 88.52 ± 9.42

mm Hg to 81.62 ± 6.48 mm Ug respectively after 2 months of yogic lifestyle educational programme. In another study, Talukdar (1994) and his co-workers noted statistically significant changes in cell membrane enzymes after yoga practices in hypertensive patients. 10-12 weeks of practising certain *yogasanas* significantly increased serum HDL levels, and caused a trend of reduction in serum cholesterol, triglycerides, LDL and VLDL (Bhaskaracharyulu *et al.* 1986). Though its beneficial role in mild hypertension seems to be fairly convincing, more in-depth studies are required to document the effect of different forms of yoga on platelet behaviour, macrophages, prostaglandin system and left ventricular dysfunction particularly changes in left ventricular hypertrophy, to decide its exact place in the overall management of hypertension and /or coronary artery disease.

The effect of yoga on bronchial asthma has also been extensively studied. *Pranayama* has been shown to reduce clinical symptoms, reduce the need for medication and increase the PEFR, FEV_1 and FVC, though FEV_1 / FVC % did not change (Nagarathna & Nagendra 1985).

Vivekananda Kendra Yoga Research Foundation (Bangalore) has developed an integrated approach of yoga therapy which aims at correcting imbalances at all levels. It consists not only of *asanas, kriyas, pranayama,* meditation, devotional sessions, but extensive coverage through lectures on the theory and philosophy of yoga. The benefits of this approach, when practised regularly over 3 to 54 months, and compared to a control group, were a decrease in the number of asthma attacks per week, reduced intake of medication (including steroids), and improved PFR (Nagendra & Nagarathna 1985, Nagarathna *et al* 1991). This approach also includes a special 8-step yoga-chair breathing exercise which has proved useful for acute episodes of bronchospasm (Nagarathna *et al* 1991). Singh (1987) demonstrated a particular manoevure (Kunjal) consisting of swallowing as much warm saline water as possible, first thing in the morning and then vomiting it out immediately, and it was shown to he helpful specially in asthmatics.

More recently, double-blind placebo-controlled crossover studies were done making use of a device which simulates pranayamic breathing (Singh *et al.* 1990). His study revealed a significant increase in the provocative dose of histamine needed to cause a 20% decrease in FEV_1 .

Apart from bronchial asthma, yogic practices are therapeutically beneficial in other diseases. Nine months of practising the integrated approach of yoga therapy (described above), significantly improved the IQ and social adaptation of 45 children with varying degrees of mental retardation, compared to a matched control group who did not practice yoga (Uma *et al.* 1989). These, children also showed a marked improvement in their concentration and eye-hand coordination as assessed by a steadiness test, within 10 days of yoga practice (Telles *et al*. 1 993).

Training in yoga is also useful to cause significant reduction in visual and auditory reaction time, increase in breath holding time and hand grip strength (Mohan et al. 1992). Fortunately, certain organisations (such as the Mitra Mandal, Maharashtra) have attempted to disseminate this training for the benefit of society, by teaching yoga to jail inmates with encouraging results (Vyavahare 1991).

In conclusion, it must be mentioned that studies on physiological changes in yoga can actually be the basis for an in-depth understanding of changes in neural processes with altered states of consciousness. For example, studies on sensory cerebral evoked potentials have already revealed that specific brain areas (i.e. thalamic nuclei) are principally involved during the relaxed state and alertness maintained while practicing pranayama (Telles et al. 1993). It can thus be seen that diverse aspects of yoga and its applications have been studied in India, and that there is an interesting and potential scope for future research.

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PART - I

YOGA IN HEALTH AND DISEASE

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The modern medical system has replaced almost all the traditional systems of medicine in different parts of this globe because of its rational basis. It has proved itself most effective in saving man from the fatal hands of contagious and infectious diseases. However, rapidly increasing incidence of stress related ailments is posing a great challenge to the modern medical system. It is here that Yoga appears to make a vital contribution to the modern medical system. To date, large number of publications are available studying various aspects of yoga in health and disease.

YOGIC CONCEPT OF ILLNESSES

The root cause of Stress induced ailments is the amplified likes and dislikes at the manomaya kosa which results in distressful emotional surges called 'Aadhi'. The life style gets disturbed because of long standing uncontrolled surges of stressful reactions like intense desire, (Kama), anger (Krodha), fear (Bhaya), jealousy (Matsarya), etc. These agitations cause violent fluctuations in the flow of prana in the 'naadis' which are said to be the channels distributed all over the body through their branching system. Each and every cell in the body, requires the right quota of its pranic energy to carry on its biochemical processes in an efficient way. The example is that of uninterrupted power supply necessary for every electrical gadget in right quantities. Just as these equipments would fail if there is any irregularity in the power supply, human organ systems fail to function if they do not get the right quantum of prana. Thus the disturbances in the Manomaya kosa percolate into physical body (Annamaya Kosa) through disturbed prana flows. Hence the management of these stress induced ailments should correct imbalances at all these levels. Yoga techniques are offered to correct the imbalances through a set of yoga practices which we have termed as Integrated approach of yoga therapy (IAYT). These are practised to correct the problem at various levels: .

Annamaya Kosa: Physical Kriyas (Traditional voluntary internal cleansing techniques), Yogasanas (body postures) and Shavasana (Relaxation posture),

Pranamaya Kosa: Five types of systematic regulated slow deep breathing practices with or without breath holding, called Pranayama,

Manomaya Kosa: Meditation (Dharana and Dhyana) and devotional session (Bhakti yoga),

Vijnanamaya Kosa: Understanding the nature of ones problems in the light of Indian thinking through self analysis (Jnana yoga),

Anandamaya Kosa: Practice joy under all circumstances (Karma yoga). Try to touch the inner core of one's self in solitude and establish in the experience that Ananda is the basic fabric of this universe including the self.

YOGA IN STRESS RELATED DISEASES

Negative emotions and psychosocial pathology are found to be related to severe asthma (Friedman, 1984; Carswell, 1985; Carson and Schauer, 1992). Self-rated hostility and depression (Schmaling et al. 1997) and higher degree of frustrating situations in their life (Berezin et al. 1997) were found to be associated with decreased pulmonary function, blood immunoglobulin levels and clinical state of the disease.

Goyeche (1982) published his work on the integrated yoga approach to asthma with beneficial results. Singh et al (1990) studied 18 subjects with mild bronchial asthma after Two weeks of practice of yogic pranayama by the use of a breathing device called pink city lung exerciser (PCL). Vedanthan et al (1998) studied the effect of yoga practices on 17 students in the age group of 19-52 years in an university set up. Daily symptom score, medication score, AM and PM PEFR, weekly questionnaires and lung functions were measured. The subjects in yoga group reported significant degree of relaxation, positive attitude and tendency for lesser usage of inhalers. We followed up 53 pairs of bronchial asthmatics in a controlled study and also 570 asthmatics in a prospective study for 3 to 54 months. There was 80% reduction in meditation & symptom scores with improved lung function in yoga group and not in control group (38). Further, regular practitioner stood to gain the best (41) .

Yoga in Anxiety Neurosis.

Norton & Johnson (1983), DeLuca & Holborn (1984), Tarrier & Main (1986) have demonstrated the comparative efficacy of different types of muscle relaxation therapies (taped instructions or applied relaxations) in different types of anxiety of both cognitive and somatic type such as snake phobia, nail biting, hair pulling, panic attacks as well as general anxiety. Tyrer et al (1988) in their randomised control study on 210 subjects demonstrated that self help group fared better than the diazepam group and consumed less psychotropic drugs. Crisan (1988) observed reduction in scores on Max Hamilton's a anxiety scale, general health questionnaire, heart rate, urinary level of VMA and a rise in galvanic skin resistance in 19 patients with generalised anxiety neurosis after 8 weeks of pranayama practice.

Yoga in diabetes

In both IDDM and NIDDM physiologically demanding stressful situations like infection, pregnancy etc. are known to increase the demand for insulin. Similarly emotional stresses also contribute to the irregular control of diabetes. Jobson et al (1991) in a well planned controlled study showed that although there was demonstrable physiological rest (reduced muscle activity and skin resistance) the progressive relaxation training and biofeedback given once a week did not help in improving diabetic control in 20 patients with type II diabetes.

Monro et al (1992) carried out a controlled trial on 21 subjects with NIDDM. Fasting blood glucose and glycosylated haemoglobin reduced significantly ($p<0.05$) in the group of 11 who practised the integrated programme of yoga as compared to a matched control group of 10 who did not practice yoga. Several other studies (Sahay et al 1986, Jain et al 1993) have shown the beneficial effects of yoga in NIDDM through reduction in hyperglycemia and the need for oral hypoglycemic agents. Rice et al (1992) observed increased peripheral blood circulation in lower extremities as measured through toe temperature and blood volume pulse in 40 diabetes in the age range of 17 to 73 years after biofeedback assisted relaxation training.

Yoga in Hypertension

Datey & his co-workers (1969) showed the beneficial effect of shavasana in mild hypertensives who were not taking medication. Patel (1973,75) has shown the beneficial effects of shavasana in hypertension in her year long follow-up control study. In an open study comprising 23 hypertensive patients Sachdeva et al (1994) observed reduction in systolic blood pressure and diastolic blood pressure.

Yoga in Coronary Heart Disease

Greenwood et al (1996) reviewed the literature and showed that both social support and life stresses influence the incidence and mortality of coronary heart disease, the latter more so than the former. The emotion support had the largest effect. Orth Gomer et al (1997) analysed the heart rate variability from a holter record during transient myocardial ischeamia and observed suppression of the efferent vagal activity and suggested that this vagal blockage may be a forerunner to onset of ischaemia.

The work of Ornish et al has become a major land mark on this path of preventive cardiology. Gould, Ornish and coworkers (1995) studied the changes in myocardial perfusion by positron emission tomography (PET) after 5 years of intense risk factor modification. The experimental group of 20 followed a programme of very low fat vegetarian diet, mild to moderate exercise, stress management and group support. Although there was a significant degree of improvement observed in the percent diameter stenosis on coronary angiography in the experimental group as compared to control group, greater degree of changes were observed in ventricular perfusion and the measurement of area of LV with less than 60% activity in PET.

Yoga in Rheumatoid Arthritis

Stress could be a major triggering or aggravating factor for the autoimmune inflammation in rheumatoid arthritis has been understood. Haslock (1994) reported the beneficial effect on grip strength and Stanford health assessment questionnaire disability index in 10 severe rheumatoid arthritis subjects, as compared to 10 matched controls who participated in a programme of IAYT. Role of yoga in mechanical back pain, carpel tunnel syndrome, cervical spondylosis, fibromyalgia and chronic pain have been studied by many workers.

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PART - II

YOGA IN HEALTH AND DISEASE

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YOGA IN REHABILITATION

Yoga practices have been tried in the rehabilitation of various socially disadvantaged groups like inmates of jails, drug abusers, alcoholics, congenitally blind, mentally retarded and children from community (remand) homes. In all these socially disadvantaged groups, either due to repressed anger or depression or anxiety, a heightened state of mental arousal could be a common underlying factor, that can interfere with their efficiency in any new learning for better living or for improved performance.

Yoga for Blind

Naveen et, al (1996)[24] on repeated recording of middle latency auditory evoked potentials (AEPMLR) demonstrated that the information processing in the auditory pathways was much better in the congenitally blind than normally sighted children showing better sensitivity in hearing enabling them to use echoes to perceive spatial position. Greater anxiety and higher heart rates were noted in the congenitally blind compared to matched normal children.[25,26]

Yoga for Psychosis and Chemical Abuse

There are several reports of the use of TM in the rehabilitaion of drug abusers and alcoholics (Shafi, 1974; Brautigam, 1972; Benson et al. 1972). We observed the beneficial effect of IAYT in the rehabilitation of schizophrenics (Telles, 1997) in a long stay home.

Yoga for Immune System

Psychological stress is thought to undermine host resistance to infection through neuro-endocrine mediator changes in immune competence. 236 pre-school children in the age group of 3 to 5 years, were studied by Boyce.[30] They compared the effect of laboratory stress of performing developmentally challenging task with two measures of environmental stress at the child care center and assessed the cardiovascular reactivity, incidence of respiratory illnesses, CD4, CD8 & CD19 cell counts, lymphocyte mitogenesis and antibody response to pneumococcal vaccine. They showed that the incidence of illness was related to an interaction of child care stress and mean arterial pressure reactivity (measure of psychobiologic reactivity to stress). They also observed an interaction between stressful life events and CD19 reactivity during stress and entering school. Klemons (1972) in their controlled clinical study assessed the degree of gingival inflammation (GI) in 46 TM meditators compared with 26 non meditators. Improvement of GI was noted in 74% of the meditators Vs 15% in non meditators. Practice of IAYT by patients with open tuberculosis in a sanitorium through controlled studies showed faster recovery in their general health, X-ray changes and sputum positivity.

Allergies, autoimmunity and cancer are other immune system disorders where the role of yoga has been experimented upon.

YOGA FOR POSITIVE MENTAL HEALTH

A positive mental health would be achieved by sharpening of perception of information arriving to the brain through all our special senses, better analytical faculty (IQ), sharper memory and on the overall improvement in personality characteristics. Emotions being the major component of human behaviour, mastery over the upsurges of emotion is considered as the sign of better health rather than just a sharpening of emotions. The capacity to replace instinctual violent emotions like anger or fear by soft emotions like love, sympathy, peace and contentment indicates higher levels of emotional health.

YOGA FOR PERCEPTION

Meditation has been described as a training in awareness, which when kept over long periods produces definite changes in perception, attention and cognition (Brown, 1977). Significant changes were reported in the visual perception of advanced meditators, who were able to distinguish subtle differences in color and shade. It has also been shown that processing of sensory information at the thalamic level is facilitated during the practice of pranayama (Telles et al. 1992) and meditation (Telles & Desiraju, 1993). These two practices, along with IAYT were found to bring about an improvement in hand steadiness in college students following 10 days of practice (Telles et al. 1993). This improvement was believed to be due to improved eye-hand co-ordination, better attention, concentration and relaxation.

We (Telles et al 1995) tested the visual discrimination in two groups of 18 college students (age 17-22 yrs) each, by their ability to detect intermittent light of fixed luminance at varying frequencies on a Critical Flicker Fusion apparatus. We observed that the improvement in Critical Flicker Fusion in yoga group occurred after 20 days of yoga instead of 10 days unlike in children where the changes were demonstrable within 10 days[38].

YOGA FOR LEARNING AND INTELLIGENCE

Shecter (1975) showed significantly greater improvement on measures of creativity (match problem test), Intellectual performance (Raven progressive matrices) and personality (Jackson personality inventory) with a reduction in their anxiety (Lickert scaled questionnaire) after practice of transcendental meditation (4 days) and science of creative intelligence (14 weeks) program in 60 high school students. Collier (1973) [39] and Heaton et al [40] demonstrated the improvement in performance and achievement in university students after transcendental meditation. In 1989 we (Uma et al) demonstrated the role of integrated approach of yoga in improving IQ in special children. [41]

YOGA FOR EMOTIONAL STABILITY

Modern day living style is laden with the ill effects of stress. Stress according to yoga is an uncontrolled surge of emotions like intense desire, anger, anxiety etc. When the stress is prolonged the person loses his capacity to come out of the clutches of the loop of intensely heightened activity that shows up as imbalances in the function of the autonomic nervous system. This shows up as generalised complaints like anxiety, fatigue, addictions etc. or as localised problems (asthma). Role of yoga to reduce the force and speed of these violent **surges of** emotions has been validated by many workers through psychophysiological studies.**In early 1970's,** the epoch making study of Wallace [42] showed that the practice of Transcendental Meditation brings about a unique "hypometabolic physiologic wakeful state" with overall sign of psychophysiological relaxation. A study from DIPAS (Delhi) showed that six months training in asanas (physical postures), pranayama (breathing practices), and meditation brought about definite physiological changes in normal volunteers, viz. an increase in orthostatic tolerance and an overall shift in the autonomic equilibrium towards parasympathodominance, as was shown during Transcendental Meditation. [43] Further studies [37] on OM meditation showed significant reduction in heart rate with an increase in cutaneous peripheral vascular resistance which is a sign of increased mental alertness even while physiologically relaxed. Telles *et al* [44] published their interesting observation that breathing exclusively through right nostril (Surya anuloma viloma) showed a 37% increase in basal oxygen consumption, as compared to 18% and 24% increase after alternate nostril (nadisudhi) or left nostril (Chandra anuloma viloma) breathing. This suggested that breathing through right or left nostril breathing may have activating or relaxing effect on the sympathetic nervous system. This was supported (Telles 1997) [45] by changes in systolic blood pressure and digit pulse volume suggesting the sympathetic stimulating effect of right nostril breathing.

YOGA FOR SOCIAL HEALTH

Better adaptability when exposed to varying sociocultural situations is an important faculty which is generally measured through various personality tests. According to yoga the most important paranieter of positive social health is "Tatsukha Sukitwam" which means joy in the joy of others. Movement from selfishness to selflessness is considered as the measure of growth of social health. At the negative spectrum of the social health one could consider antisocial behaviours like crimes, accidents etc. that show up because of increasing degree of selfishness with total lack of social awareness and civic sense.

In 1976 Borland *et al.* published their interesting paper on "Maharshi effect" wherein they demonstrated a sudden downward shift in the trend of increasing crime rate when about 1 % of the city population had begun the TM technique. A comparison of 11 US cities with population over 25,000 with 0.97% or more of their population practising TM with 11 matched control cities showed that the mean change in crime rate from 1972-1973 among the control cities had increased by 8.3% as compared to a decrease of 8.2% in cities with 1 % meditators, the difference being statistically significant.

YOGA FOR SPIRITUAL HEALTH

Texts on Yoga and Upanishads describe the criteria of spiritual health as self awareness of one's natural state of contentment. The joy or happiness is independent of any external agency. Such a person's activities are not motivated by the need for material gains of money, name or fame and they function in the society totally in tune with cosmic order characterised by simplicity, truthfulness and confidence. This is a state of eternal bliss and contentment, undisturbed by the ups and downs of the life.

The nearest measure of such a state described by the modern psychologists could be that of "self actualization". Many studies were conducted on transcendental meditators to show improved scores on self actualization values, spontaneity, self regard, self acceptance, synergy, acceptance of aggression, capacity for intimate contact in meditation as compared to non meditators[46,47,48] This was measured by Shostrom's personal orientation inventory of self actualization.

Triguna questionnaire which is based on satva, rajas, and tamas type of personality described in Bhagavad gita and other Indian texts may prove to be a good tool for measuring the spiritual growth of the individual.

Studies on higher states of consciousness[48]

New theories in physics defining consciousness as the base of all being, research in ESP, telepathy, rebirth and psychoneuroimmunology are all opening up newer avenues of understanding of the subtler aspect of positive health, which were not in the perview of science until recently.[50]

Yoga in memory

Improved information processing at thalamocortical pathway, better attention, concentration and emotional stability forms the basis for better registration and retrieval. Abrams[15] showed a direct relationship between transcendental meditation, quicker acquisition and higher recall performance in 14 subjects. Effect of breathing through a particular nostril on selective memory test for 'right' (spatial) and 'left' (verbal) brain functions [45] were studied. 108 school children with an age range of 1 0 to 17 years were randomly arranged to 4 groups. Each group practiced a specific yoga breathing technique namely (a) right nostril breathing (SAV), (b) left nostril breathing (CAV), (c) alternate nostril breathing (NS), (d) breath awareness without manipulation of nostrils. Yoga training caused an increase in verbal and spatial memory scores within 10 days. For all groups there appeared to be more marked improvement in right brain functioning. A marginal difference was obtained between the scores of the SAV and the CAY groups, suggesting an ipsilateral beneficial effect.

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EFFECT OF 'PRANIC' HEALING IN CHRONIC MUSCULOSKELETAL PAIN – A SINGLE BLIND CONTROL STUDY

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Abstract

Objective: To compare the immediate effect of pranic healing, a non-touch non pharmacological method of treatment, in chronic musculoskeletal pain with a placebo session of random hand movements.

Design: A self control single blind study. Patients were blind folded with an eye band on both days of the healing and placebo session.

Setting: Patients admitted for the treatment of chronic pain in the residential health home of Vivekananda Kendra Yoga Research Foundation, Bangalore, South India.

Subjects: 50 Patients with chronic non-malignant continuous musculoskeletal pain of more than 6 months duration. Group A (N=25) had placebo on first day and group B(N=25) had pranic healing on first day.

Intervention: Pranic healing of 25 minutes compared to placebo session of 25 minutes carried out on 2 consecutive days.

Main outcome measures: Pain Analogue scale and physiological measures of sympathetic activity namely heart rate, respiratory rate, galvanic skin conductance, blood pressure and finger plethysmography.

Results: Highly significant reduction in pain and sympathetic activity in pranic healing group (student's t- test $p < 0.001$) and non-significant change in placebo group. Multivariant discriminant analysis followed by Wilks' Lambda criteria for significance showed pranic healing is the best in both groups A and B.

Conclusion: Pranic healing when performed in the standardised method by a trained healer is effective in reducing continuous chronic pain of musculoskeletal origin, within 25 minutes as compared to placebo random hand movements which appears similar to the standard method of pranic healing.

Healing through different procedures of balancing the subtle energy system in the energy body has been practised as an art in ancient cultures of China and India for thousands of years. According to the Chinese system of acupuncture, acupressure and qigong therapy, blocks occur in the channels of flow of this subtle energy called 'chi' or 'qi' resulting in illness.

The aim of therapy is to restore the uniform balanced flow of 'chi' in all the channels[1]. Similarly the Indian system of yoga deals with this imbalance of energy, called 'prana', through breathing practices and meditation[2].

While the system of spiritual healing and Therapeutic Touch is said to correct these imbalances through touch and prayer, the School of Pranic Healing in India claims to correct these imbalances in the energy body by a non-touch method.

Investigations are underway to detect the presence of this energy which is different from all known physical electromagnetic energy fields. Bio-electrography is an attempt to get photographs of this energy field.

Chouhan and Rajaram in 1986 [3,4] standardised and measured the corona images of fingers obtained on a background of high frequency high voltage electrical fields. They analysed the bioelectrography pictures of 246 subjects with cancer of the cervix uterus and defined a malignancy specific pattern for early detection of cancer.

Richard Pavak [5] presented the beneficial effect of 'shen' – a specific form of qigong therapy in the chronic pain of dysmenorrhoea, migraine and chronic low back pain syndrome. Jia Zin and Jia Jinding [6] demonstrated the amount and density of callus formation to be significantly higher in emitted 'qi' group compared to control group in experimentally induced fractures in rabbits. Loh, L, et al [7] found the benefits of acupunture comparable to medical treatment in migraine and tension headache.

Pranic healing (PH), standardised and taught by Master Chao Kok Sui [8] from the Philippines is a procedure of manipulating this pranic energy body which is felt and or seen as an aura or energy field around the physical body. Present study has been designed to validate the immediate effect of a pranic healing session in chronic pain through a self-controlled design.

MATERIALS

50 subjects with chronic pain who had volunteered to undergo a non-phrmacological yoga therapy inpatient programme were taken up for the study on first two days of their stay before they started practising yoga.

Patients with chronic continuous pain of non-malignant cause who satisfied the criteria for chronic pain (Melzack) [9] of more than six months duration were included in the study. All 50 patients had pain of musculoskeletal origin. The causes of pain were, pain at rest due to chronic tension headache, low backpain, knee pain (osteoarthritis), frozen shoulder, cervical spondylosis, arthralgia in multiple joints and generalised muscular pain (table 1).

Patients who were getting intermittent episodic pain or pain only during activity were not included in the study.

METHODS

After explaining the nature of the therapy, written consent was obtained for 30-minute pranic healing session on two consecutive days. Subjects were requested to wear thin cotton casual dress for the healing session. After initial assessments in the laboratory, subjects were seated on a comforable stable stool in the annexure room of the laboratory which is quiet, safe and open. Subjects were blind-folded and checked for comfort and accuracy.

The healer began her therapy with an initial prayer, energising the palm of her hand (two mins), and moving her hand over the surface of the body (about five centimeters away) in a systematic manner from head to toe.

The healing procedure involves working with the prana(subtle energy) body which is supposed to be felt and or seen by the trained healer as an aura around the physical body. The healing involves three steps:

Step one.

Scanning for abnormalities in the energy field (aura) and energy pools(chakras)

Step two.

The healer 'cleanses' the abnormalities.

Step three.

'Energising' with suitable quality and quantity of energy to the required part.

All these actions are done by hand movement of the healer all around the body by the non-touch method.

The session ends by 'delinking' the healer and the healed through hand movement and a closing mental prayer. The whole procedure lasts 25 minutes.

The same healer carried out the placebo session (P) on the next day keeping all other conditions constant. This time the healer moved her hands at the same distance from the body for the same distance from the body for the same duration(25 minutes) but in a random way, without going through the standard organised three step healing procedure. For an untrained person these movements appear similar to the healing session.

Patients were told that both days were healing sessions and were again blindfolded. All other conditions were kept constant to make it a single blind study.

Some 25 subjects(group A) had the control session on the first day and PH sessions on the second day were reversed with PH session on first day and control session on second day in 25 subject s (group B).

Assessments were done immediately before and after the session on the both days, using the following tests.

Table 1 Demographic data

Variables	Pranic Healing (PH)	Placebo (P)
Number of patients	50	50
Males	25	25
Age, years mean (SD)	46.59 (12.67)	45.71 (10.99)
Duration of pain	> 6 months	> 6 months
Causes of pain		
Tension Headache	7	6
Low Back pain	6	6
Knee pain (Osteoarthritis)	2	3
Frozen shoulder	2	2
Cervical spondylosis	2	2
Arthralgia in multiple joints	2	2
Generalised muscular pain	4	4

Table II

Whole group n = 50				
Pranic healing	Before	After		
Parameter	Mean ± S.D.	Mean ± S.D.	't' value	Sig
PAS	61.14 ± 31.21	29.08 ± 25.98	-9.82	**
HR	89.61 ± 12.73	86.12 ± 11.36	-5.72	**
RR	18.34 ± 3.76	17.59 ± 3.59	-2.54	*
GSC	3.80 ± 3.07	2.59 ± 3.35	-5.82	**
PHT	1.92 ± 0.97	1.58 ± 1.00	-3.32	*
SYS	125.80 ± 15.33	116.80 ± 14.03	-8.28	**
DIA	84.64 ± 10.45	78.05 ± 10.54	-7.10	**

Whole group n = 50				
Control	Before	After		
Parameter	Mean ± S.D.	Mean ± S.D.	't' value	Sig
PAS	47.82 ± 36.99	47.68 ± 36.64	-0.22	NS
HR	89.13 ± 11.44	86.72 ± 11.90	-1.69	**
RR	18.27 ± 4.56	18.16 ± 4.48	-0.47	NS
GSC	4.62 ± 5.05	4.81 ± 5.03	1.56	NS
PHT	1.94 ± 1.04	1.92 ± 0.89	-0.27	NS
SYS	119.64 ± 15.60	118.34 ± 5.56	-2.09	*
DIA	79.02 ± 9.56	237.80 ± 1131.73	0.99	NS

Legend for Table 2:

PAS - Pain Analogue Scale
HR - Heart Rate
RR - Respiratory rate
DIA - Diastolic Blood Pressure
**p < 0.01 ** < 0.005.*

GSC - Galvanic Skin Conductance
FBA - Finger blood flow Amplitude on Plethysmography
SYS - Systolic Blood Pressure

Pain analogue scale

This is considered to be a simple and reliable measure of pain consisting of a 10 centimetre horizontal line marked in the centre of a clean white sheet with 'nil pain' and 'worst possible pain' written in words at the two extremes and used to assess the severity of pain. The subject indicates his degree of pain by marking a dot on this line. Different sheets were used before and after the session, coded and kept away for measurements by a non-healer.

Physiological measures

Autonomic nervous functions - namely, heart rate, respiratory rate, galvanic skin conductance and finger plethysmography were recorded before and after each session on a model 10 polygraph (Recorded and Medicare, Chandigarh, India).

Blood Pressure

This was recorded by using a mercury sphigmoinanometer (Diamond Company).

RESULTS

Table 1 shows the demographic data of patients in two groups.

Students two-tailed 't' test performed on the values obtained immediately before and after the PH and P sessions (table 2), shows that in the PH group Pain Analogue Scale, heart rate, galvanic skin conductance and blood pressure have changed to a highly significant degree (p<0.001) with a lesser degree of significance in respiratory rate (p=0.002) and amplitude of pulse wave in finger plethysmography (p=0.01).

TABLE III

Group A (n = 25)

	Day 1 = control				Day 2 = Pranic healing			
Parameter	**Mean ± S.D.**	**Mean ± S.D.**	**'t' value**	**p**	**Mean ± S.D.**	**Mean ± S.D.**	**'t' value**	**Sig**
PAS	66.52±36.78	67.80±34.49	1.35	NS	64.12±32.93	64.12±32.93	-7.47	<001
HR	88.06±10.51	85.37±11.06	-3.20	<0.01	88.71±11.52	85.33±10.78	-4.57	<001
RR	18.15±3.69	18.54±3.30	1.35	NS	18.40±3.83	18.29±2.87	-0.29	NS
GSC	2.36±1.41	2.52±1.72	1.12	NS	5.12±3.76	3.27±2.97	-5.16	<001
PLETHYS	1.78±0.89	1.79±0.86	0.04	NS	1.90±0.87	1.60±0.92	-2.04	NS
BPSYS	121.20±19.87	120.08±18.6	-1.26	NS	125.0±19.57	115.84±16.09	-5.59	<001
DIAST	78.84±12.98	78.12±11.73	-0.96	NS	83.28±13.42	77.48±0.74	-2.20NS	

Group B (n = 25)

	Day 1 = control				Day 2 = Pranic healing			
Parameter	**Mean ± S.D.**	**Mean ± S.D.**	**'t' value**	**p**	**Mean ± S.D.**	**Mean ± S.D.**	**'t' value**	**Sig**
PAS	58.16±29.76*	33.96±26.94	-7.74	<0.01	29.12±26.71	27.56±26.61	-2.03	NS
HR	90.51±14.02	86.90±12.07	-3.65	<0.01	90.24±12.42	88.06±12.75	-3.60	<001
RR	12.28±3.76	16.89±4.29	-3.29	<0.01	18.39±5.38	17.77±4.94	-1.72	NS
GSC	2.47±1.21	1.90±1.19	-4.74	<0.01	2.36±1.4	12.52±1.70	1.12	NS
PLETHYS	1.93±1.07	1.58±1.08	-2.61	<0.02	2.10±1.17	2.04±0.92	-0.32	NS
BPSYS	126.60±9.74*	117.76±11.88	-6.05	<0.01	118.08±9.81*	116.60±11.79	-1.66	NS
DIAST	88.00±6.25*	79.76±7.24	-2.20	NS	79.20±4.25*	77.48±0.74	-2.20	NS

Legend for Table 3: Student's 't' test for the differences of values before and after the control and healing sessions. In both groups A and B there is highly significant improvement in all parameters on the PH session as compared to control session.

** The initial values on 2nd day in group 'B' is significantly (p<0.001) lower which is not seen in group 'A' – could be due to lasting effect of 'PH'.*

In P group all the major parameters are non-significant except heart rate ($p<0.001$) and blood pressure (0.05). Similar changes are seen in the sub groups A and B who had reserved the days of healing and placebo sessions (table3). Another interesting point that may be noted from this table is that the initial mean values (for PAS, systolic and diastolic BP) in group B (PH on the first day) are significantly low ($p<0.001$) as compared to group A (P session first day) where the differences for the initial values are non-significant for these there parameters.

Could this difference be due to the lasting effect of PH the previous day or other factors such as, leisure or strangeness of being away from home, change of diet, familiarity of the healer and the healing session, and so on, factors which were constant for both groups? Table 4 shows the transformation matrix obtained after Multivariate discriminant analysis with Wilk's Lambda test for significance[11]. This also shows that the PH group had the best results in both group. A (88 per cent) and group B (92 per cent).

DISCUSSION

In April 1998, Dr Linda Rosa and collegues [12] published their studies on the ability of 21 senior Therapeutic Touch practioners to 'perceive' the energy field, in a blinded condition. The therapists were asked to state whether the investigator's unseen hand hovered above their right or left hand. They gave the correct answer only in 123 out of 280 trials, a success rate of 44 per cent which could have occurred purely by random chance. As a result the researchers concluded that the claims of Therapeutic Touch has no scientific basis. Our present single blind self-control study, comparing the standard technique of pranic healing with a placebo session of random hand movements, has clearly shown immediate reduction in pain (PAS) in patients with chronic pain of more than six months duration.

The highly significant reduction in sympathetic activity (HR, RR, GSC amplitude of pulse wave on finger plethysmography and BP) seen in the PH group is further objective evidence for the physiologically relaxing effect of PH.

Considering the negative result of Dr.L.Rosa et al, we may wonder how PH could work if the healer does not sense the energy fields and recognise the abnormalities. The ability of the healers of the PH group to perceive pranic energy field may be different from that of Therapeutic Touch practioners. We need to design a study to check this ability in our healers.

Assuming that our healers also may not have perceived the prana field during the first step (scanning) of PH, could it be that steps two and three – that is, the general cleansing and energising of the prana body with a divine prayer – is responsible for the therapeutic effect observed in this study?

The first step of scanning (to perceive and or see the prana) may not be demonstrable in less experienced healers and if the healer perfects this step it may be that the therapeutic procedure would become even more effective for deeper and longer corrections. More work needs to be done to answer such questions.

The next question that would arise in this study is about the mechanism of pain relief and reduction in sympathetic tone. The explanation offered by the healers is that, during chronic pain the subtle energy fields are disturbed and it shows up in the physical body as pain. The imbalance could be induced by various factors at the physical level (trauma, aging) or at the mental level (depression, anxiety, stress).

TABLE IV

Predicted Group Membership

	N	GroupA		N	Group B	
		1	2		1	2
Group C	25	21 84%	04 16%	25	20 80%	5 20%
Group PH	25	3 12%	22** 88%	25	2 8%	23** 92%
% of grouped cases correctly Classified	25	88%		25	88%	

Legends for Table IV:

Multivariate descriminant analysis with Wilks Lambda Criteria for significance.

Group A - Control on first day. Pranic healing on second day.

Group B. Pranic healing on first day. Control on second day.

*** Best results in PH group in both Group A (88%) and Group B(92%)*

The healer sets right the abnormal in the pranic body through transferring the divine energy that is gathered from the cosmic energy fields and thus balances the energy flows. This is experienced by the patients as relief from pain and deep rest. Reduction in sympathetic activity seen immediately after the session can be due to reduction in pain. At this stage of understanding of science it is not possible to explain the exact mechanism of pranic healing until we are able to get more objective evidences and measures of the energy fields described by these healers.

The conclusion of this single blind control study is that PH reduces the pain and sympathetic activity after the of musculoskeletal origin and that this reduction is not placebo hand movement session which may appear similar to PH Session in all its external appearances.

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BASELINE OCCUPATIONAL STRESS LEVELS AND PHYSIOLOGICAL RESPONSES TO A TWO DAY STRESS MANAGEMENT PROGRAM

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The benefits of work site stress management programs for asymptomatic employee populations remain to be established. The present study evaluated the physiological changes of a yoga based stress management program for 26 asymptomatic, male, middle managers. The Occupational Stress index (OSI) and autonomic parameters were measured. Data of subjects with OSI greater or less than the median ware analyzed separately. The 't' test for paired data was used for pre-post comparisons. The whole group (n=26) showed a significant decrease in breath rate (p< .005) after the two day program, with no other changes. Subjects with OSI more than median (n = 13) showed a significant decrease in breath rate (p< .01), in the power of the low frequency component of the heart rate variability spectrum (p<.05), and in the low frequency: high frequency ratio (LF/ HF) (p<.05) and an increase in the high frequency component (p<.05) after the program, with no changes in the subjects with OSI less than the median.

Work related psychosocial stressors are known to affect the body functions through psychological processes, and influence health through four types of closely interrelated mechanisms-emotional, cognitive, behavioral, and physiological (Levi, 1990). The health outcome depends on situational (e.g., social support) and individual factors (e.g., personality, coping repertoire).

The increase in occupational stress has led to many work site stress management programs (Fiedler, Vivona - Vaughan, & Gochfeld, 1989), which have attempted to reduce workers stress. The efficacy of these procedures for asymptomatic employees has been questioned in the absence of recording of objective physiological changes.

The present study was conducted to evaluate psychophysiological responses to a two day, yoga based stress management program, and to study psychophysiological changes based on levels of occupational stress at baseline.

METHOD

Subjects

The subjects were 26 male volunteers who were attending a two day workshop on self-management for excessive tension through yoga. Their ages ranged from 34 - 54 yrs. (group average age = 43.0 ± 5.5 years), and none of them had previous experience of yoga or any relaxation procedures. All subjects were in the same occupation (middle managers from an electronic goods company) for at least two years prior to the test.

DESIGN

Assessments ware made at the beginning and at the and of the two-day workshop. During the polygraph assessments the subjects were seated in a dimly lit, sound attenuated room.

Assessments

The Occupational Stress Index (OSI) (Srivastava & Singh, 1981) was administered before the program. The OSI has 46 statements to which the participant had to respond with Yes or No. For 29 statements 'Yes' was scored as '1' and 'No' as '0', whereas for 17 statements it was the reverse, i.e., 'No' was scored as '1', and 'Yes' as '0'.

The following data were recorded using a 4-channel polygraph (Medicaid Systems, Chandigarh, India): (i) EKG was recorded using standard limb lead 1 configuration. The EKG was digitized using a 12 bit analog-to-digital convertor (ADC) at a sampling rate of 500 Hz. The data recorded were visually inspected off-line and only noise tree data were included for analysis (Raghuraj, Ramakrishnana, Nagendra, & Telles, 1998). The R waves were detected to obtain a point event series of successive R-R intervals, from which the beat to beat heart rate series was computed. Frequency domain analysis of heart rate variability (HRV) data was carried out for the 5-minute recordings. The mean heart rate was obtained from this record. The mean values were removed from the heart rate series to obtain the HRV values. The HRV power spectrum was obtained using Fast Fourier Transform (FFT). The power in HRV series in the following specific frequency bands was studied, viz., the very low frequency (VLF) band (0 - 0.05 Hz), low frequency (IF) band (0.05 - 0.15 Hz), and high frequency (HF) band (0.15 - 0.50 Hz). The low frequency and high frequency values were expressed as normalized units, which represent the relative value of each power component in proportion to the total power minus VLF component (IF norm = IF/ ((total power-VLF) × 100); H F norm = H F/ ((total power-VLF) × 100) (Task force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996). (ii) The breath rate (in cycles per minute) was calculated by counting the breath cycles in 60 second epochs, continuously. For each subject, the average of the values obtained during the 5-minute session was used for analysis..

Yoga practice

An idea from the traditional yoga texts that a combination of activating and pacifying practices may help reach mental equilibrium (Chinmayananda, 1984), was the basis for the main practice during the two-day program, called 'cyclic meditations It includes the practice of yoga postures interspersed with relaxation while supine, so as to have a combination of "activating" and 'pacifying" practices (Nagendra & Nagarathna, 1997). Apart from the yoga practices the two-day stress management program also consists of a series of lectures (5 hours) on topics such as ancient Indian philosophical concepts about stress.

Data analysis

(i) Pro-post stress management program comparisons were based on a t- test for paired data.

(ii) The polygraph data of subjects with OSI greater than the median wore analyzed separately from data of subjects with OSI less than the median. These data were also compared (pre-post) with the paired t- test.

RESULTS

The group means and SDs obtained in pre and post recordings are given in Table 1

Table 1 Mean ± SDs of Autonomic Variables Pro-Post Recording Sessions in Groups with OSI less than or greater than Meadian

Parameter		Whole group (n = 26)		OSI < median (n = 13)		OSI < median (n = 13)	
		Pre	Post	Pre	Post	Pre	Post
Heart rate	Mean.	83.3	84.6	79.0	81.1	87.7	88.1
(bpm)	±SD	12.9	11.9	12.0	10.7	12.7	12.4
Respiratory	Mean	17.4	16.3***	17.8	17.0	17.0	15.5**
Rate (cpm)	±SD	4.2	4.6	4.7	4.6	3.9	4.7
Low frequency	Mean	35.0	34.3	36.2	36.4	34.8	31.3*
(in nU)	±SD	6.6	9.6	8.7	12.3	4.2	6.2
High frequency	Mean	64.9	65.6	63.5	63.5	65.1	68.6*
(in nU)	±SD	6.6	9.6	8.9	12.3	4.2	6.2
LF / HF ratio	Mean	0.55	0.56	0.60	0.64	0.54	0.46*
	±SD	0.1	0.3	0.2	0.4	0.0	0.1

*P < .05, ** P < .01, ***P < .005, paired t test, 'post' compared to 'pre'

The whole group (n=26) showed a significant decrease in breath rate after the two day program, with no other changes.

The polygraph data of subjects with OSI greater or less than the median (= 24.5) were analyzed separately. Subjects with OSI more than median (n = 13) showed a significant decrease in breath rate, in the power of the low frequency component of the heart rate variability spectrum, and in the low frequency; high frequency ratio (LF/HF). In these subjects the power of the high frequency component was significantly.

More after the program. In contrast, the subjects (n = 13) with OSI less than the median, showed no changes after the program.

There was no correlation between the OSI at baseline and polygraph measures (I) at baseline and (ii) recorded post compared with pre.

DISCUSSION

At the end of a two-day yoga based stress management program, the breath rate was lower, with no other change. However, when subjects were categorized based on their occupational stress index as OSI greater or less than the median, the two categories showed different trends. The 'OSI greater than the median' group showed a decrease in breath rate, also peak power of LF of the HRV, and LF/HF, with an increase in the HF peak power. The 'OSI less than the median' group showed no change.

In this study one of the main questions to be answered was whether the two-day stress management program would change objective measures in the asymptomatic middle managers, who were participants. Apart from a decrease in breath frequency, there were no other objective signs of reduced physiological stress after the program. However, subjects with more than the median levels of the occupational stress index showed changes in the LF and HF components of the HRV spectrum. The LF component is known to correspond to sympathetic and HF to vago-sympathetic activity of the ANS (Malliani et al., 1 991). Subjects with high occupational stress scores at baseline appeared to be more likely to show reduced sympathetic activity after the two-day program. These results are in keeping with those of a previous study, which described that subjects with higher initial arousal and inability to focus attention showed better physiological rest after isometric squeeze relaxation, rather than meditation (Weinstein & Smith, 1992).

Hence the results suggest that following a two-day yoga based stress management program subjects with higher levels of occupational stress, who do not necessarily show raised sympathetic arousal at baseline, show significant reductions in sympathetic activity.

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YOGA - A NATIONAL PERSPECTIVE

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The rule of the British in India, in a sense, was a boon for India. Their ulterior motive of initially, business and then to conquer India no doubt succeeded. But the subtle tactics of education to create an army of slaves and clerks in India so that the British could rule India for eternity did not work for long. The English-educated little genius Naren, with an innate urge to find God, powered by Gadadhara, the great Ramakrishna Paramahansa, reversed the calculations of the British. The studentship of Sri Aurobindo in England only made him a master of English, Greek and Latin, training in Law helped Gandhi to give a concrete shape to Ahimsa and Panchasheela, the key features of Hindu religion, as a tool to organise the society to relieve Mother Bharat from the shackles of slavery. The backlog of identity crisis, selfishness and pettiness, Tamas and corruption is reaching an end now after half a century of Independence, thanks to the mass organisation invoking the patriotic fervour of Hindu renaissance initiated and powered by many geniuses of different organisations, concretising the dream of Swami Vivekananda to bring the organisational skill of the West with which 'he fell in love' in USA for the reconstruction of India.

The vision of Swamiji was to rebuild Mother Bharat in tune with her personality enshrined in yoga and spiritual lore. The genius of Eknathji Ranade located the holistic concept of yoga, another name for spirituality in the words of Swami Vivekananda 'Each Soul is potentially Divine,' and adopted it as the basis of Vivekananda Kendra(VK). He could see the vision of Sri Aurobindo enunciating Integral yoga as a furthering depth of Swamiji's thoughts on yoga. Eknathji trained in the organisational skills and powered by a patriotic fervour with the holistic vision of Hindu nation enunciated a century ago by Swami Vivekananda, in tune with the emerging trends of popularity of yoga gave a direction to the Kendra in his first pamphlet 'Yoga, the core of Vivekananda Kendra'.

Yoga and its Streams

Yoga, not as a rope trick or magic, not merely as yogasanas, pranayama, mudras, bandhas, meditation or kriyas, but as a science of holistic living, became the unique feature of VK movement.

Yoga is not only to be adopted as a tool of man-making but also for nation-building, Swamiji said. To use Jnana, Bhakti and Raja Yoga methods for all-round personality development at the physical, mental, emotional and intellectual levels. And to translate the same into action through Karma Yoga-Tyaga, Seva and Atmabodha are the threefold dimensions of Karma Yoga, said Eknathji and incorporated them in our Kendra Prarthana. The first two, 'the twin ideals of our nation' are adequate tools for nation-building. Atmabodha the third, the Jnana dimension of Karma Yoga, is needed to bring the holistic vision of 'Reality' to practical life. Swamiji had said that Vedanta is not to be kept in books and scriptures, nor limited to scholars of reknown but should be brought down to life - practical Vedanta for the masses, too.

Yoga in Action

To work in tune with Reality, action in relaxation, converting all problems, difficulties and challenges into opportunities for self- growth and nation-building by being in blissful awareness at all times, with a full understanding that our casual nature is Bliss itself - Sat chitananda svarupa, potential divinity in life, to lead a life of happiness, health and harmony. Thus brining ecology in nature, peace, love and affection, cooperation in society, eliminating student unrest, drug and gun culture, divorces, psychosomatic ailments and psychiatric disorders, greed and speed at the base of a host of stress- triggered, aggravated and maintained problems in every nook and corner of our nation and thereby all over the globe.

Yoga Research

Yoga is verifiable by scientific research as it is no dogma or blind faith. Eknathji, with a vision for future, inspired doctors to start a research wing of yoga which has grown as VK YOGAS*, 'One of the the 4 premier yoga institutions in the country' in the words of the Secretary, University Grants Commition. Starting from Yoga Therapy Research, the Yoga Foundation has spread its wings to several dimensions of modern life.

Quantum Physicists have started enlarging the scope of modem science by using consciousness-based approach, the essence of yoga, in contrast to the existing matter-based approach. The scientists are clear, that the existing paradigm which assumes that matter is primary and mind etc. are its offshoots, has led to increasing number of paradoxes in physics and unexplainable things as mind- body healing, rebirth, ESP, psychokinesis, the recorded activities in the haunted houses by the hardcore scientists themselves. 'Science within Yoga' is the theme of the book 'Self Awareness Universe' of Prof. Amit Goswami - quantum physicist of reknown. The effectiveness of yoga practices for treating ailments is getting support from research findings of medical researchers. Extensive research on Asthma, Diabetes, Hypertension, Anxiety Neurosis, Eye problems. Mental retardation, Cancer etc., has been done over the last 2 decades with nearly 50 research papers published in leading national & international medical research journals. Nearly 75000 patients of bronchial allergies, 1200 cases of Diabetes Mellitus, etc. have been treated very effectively by the integrated approach of yoga practices having its roots in Panca Kosa Viveka of Taittiriya Upanishad and Adhi-Vyadhi concept from Yoga Vasistha. Long term follow-up is a feature of our clinical research studies, as all these ailments of the modern era are extremely sensitive to changes in food, atmosphere, place, treatment modalities, etc. Unless the course of the disease is studied with a long-range perspective, the total rehabilitation (cure) cannot be established.

Yoga and Education

The role of yoga has the ability to fill the vacuum in modern education which is essentially left brain-oriented. As Swami Vivekananda had envisioned, we should not be satisfied with information-gathering & bread-earning education. He said, 'Education is the manifestation of perfection already in man'. To build an all-round (4-fold) personality-physical, mental, emotional & intellectual with a spiritual basis and 4-fold consciousness-civic sense, patriotism, service zeal and spiritual urge, should be the goal of education. To translate this vision to action, the yoga research wing has done extensive research. Research on yoga has shown that the right modules of yoga practices can develop the right brain, eyesight, hearing, speech, memory (audio, visual, audiovisual, short & long range IQ), creativity and culture the emotions which can develop, nation building features in the students.

Yoga for the Corporate World

The fourth dimension of yoga research concerns with the problems of the corporate world. Target-oriented, profit-motivated, highly competitive scenario has no doubt brought great achievements in the era of technology with air travel, television, computers, the latest internet and web have started translating the vision of a 'global village' to a reality. If only a 'Sanjaya' could see through his divine vision sitting in the palace what was developing in the war field, technology has made it possible for everyone sitting in their houses to see what is happening round the globe. Yet, the horrors of the massive technological stir with great speed, as Samudra Manthana, has brought the Halahala (poison) in the form of STRESS, encompassing the whole world from top to bottom including modern little kids complaining of stress, tension & boredom to their moms and papas. A multidimensional answer is yoga, eliminating the causes of stress as physical strain and traumas, mental restlessness, emotional upsurges and deep-rooted psychological (intellectual) conflicts; by a simple module of SMET conducted in 1200 industries encompassing nearly 25000 executives, workers and women in the industrial atmosphere; and a Holistic Systems Management adding dimensions of health, growth and contributions to society; all worked out systematically with data acquisition and its analysis; the TQM way for quality products and services. Many research publications of VK YOGAS have added strength to this application of yoga to the corporate world.

OTHER APPLICATIONS OF YOGA

Can you help the slow learners, mentally retarded, blind, children in orphanages, remand homes, prisoners, etc? Yes, proclaim the research findings and authoritative research papers published by VK YOGAS in indexed journals.

What about women and their problems? Yoga research findings have shown that even intrauterine growth retardation in babies can be very significantly reduced; promote normal deliveries of healthy babies by reducing the stress and tensions in the carrying mothers and mobilising the abdominal muscles for smooth and effortless deliveries; yoga can help in normal deliveries; yoga can help in eliminating menstrual disorders through very simple asanas and breathing practices; reduce the fatigue of work at homes & offices by providing deep rest to their organs and systems through asanas, pranayama & meditation. Use of bhajans as part of the Bhakti Yoga has helped large number of women to gain mastery over their emotions by eliminating emotional instabilities and upsurges occurring due to periodic hormonal changes.

Understanding the science of emotions culture, the secret of Bhakti Yoga, many families have been built with virtues of harmony and love, respect for elders, service of the guests, etc. The chanting of prayers, pujas & vratas have set their daily routine on the path of progress towards highest bliss, knowledge and power. Women & mothers are emerging as the nuclei of love & inspiration to set ideals of Tyaga and Seva. The patriotic songs have started replacing the bhoga-oriented selfishness-triggering filmy music. Women, through teaching of yoga to children, have started instilling the right samskaras for their total growth.

Does yoga have an answer to addiction? Thousands of addicts have left smoking, alcohol and drugs, thanks to the practice of kriyas, asanas, breathing practices and meditation. Their new life of restraint and self-governance has been a life of intense inner joy of great victory. As human beings of great-achievements and pride, they participate in the nation-building process of the Vivekananda Kendra & other organisations.

DIMENSIONS OF APPLICATIONS OF YOGA RESEARCH

With best sellers as Quantum Healing, Perfect Health, Ageless Body & Timeless Mind, etc. emerging from the pen of Dr. Deepak Chopra, the most wanted man next to Clinton in USA, nearly a hundred hospitals officially using yoga and yoga therapy for their patients; a ten thousand teachers in UK, four major schools of yoga in Japan; large scale practice of yogasanas in Europe, Australia, etc, the global influence of yoga on Indian scene is no imagination. With nearly 3000 teachers in 8 states of Bharat, trained for introducing yoga in schools by Vivekananda Kendra itself, 5 University Centres of VK YOGAS starting certificate & diploma courses in yoga and 5 major schools of yoga in India joining hands and working in coordination with mutual respect, have started making a good impact of yoga in the whole country.

Thus, yoga in a national perspective is adding dimensions to Mother Bharat's growth as a Jagadguru, to emerge as a Superpower in our globe, not to exploit others, crush & dominate others, nor to rule on others but to effectively spread the message of love, health, harmony and peace in the current world of gun, greed & sex.

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The Dimensions of yoga research in a nutshell is encompassing almost all aspects of modem society as found through the research papers presented in the four (so far) International Conferences on 'Frontiers in yoga research and applications' organised by VK YOGAS in their Headquarters at Prashanti Kuteeram, Bangalore.

Regular seminars, update symposia bring the findings of yoga research to yoga enthusiasts, sadhakas, instructors and teachers all over the country.

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What is VYASA?

VYASA is a Global Movement combing the best of the East (Yoga) with that of the West (Scientific Research) to bring Health, Harmony, and Happiness on Earth.

VYASA is the short form of Vivekananda Yoga Anusandhana Samsthana (Vivekananda Yoga Research Foundation). Since 1980 VYASA has grown under different names i.e. Swami Vivekananda Yoga Anusandhana Samsthana (sVYASA) from Feb 2000 to April 2002, Vivekananda Kendra Yoga Anusandhana Samsthana (VK YOGAS) from 1986 to 2000, and Vivekananda Kendra Yoga Chikitsa Tatha Anusandhana Samiti (VKYOCTAS) from 1981 to 1986.

What is Prashanti Kutiram?

The head quarters of VYASA is located in Prashanti Kutiram **(meaning Abode of Peace),** a spacious campus in the rural surroundings in Jigani Village, 20 miles from Bangalore off Bannerughatta-Anekal road (1 hour from Bangalore Air port). It consists of Arogya Dhama (Yoga Therapy Health Home), Indian Yoga Institute now grown as Vivekananda Yoga Maha Vidya Peetham, a Deemed to be University (or in short VYOMA) and Ashrama.

Objectives of VYASA

1. To bring the benefits of yoga to every one in the society and
2. To make yoga a socially relevant science by using the modern tool of scientific research.

Main Activities of VYASA

1. Yoga for General Public
2. Yoga for unraveling the hidden dimensions of human potential
3. Yoga in Education for total Personality Development
4. Yoga Therapy for Modern Ailments
5. Yoga for corporate sector to deal with Stress and Management System.
6. Training in Yoga education - Certificate, Diploma, Bachelor, Masters & Doctoral courses in the Divisions of Yoga & Spirituality, Yoga & Life sciences, Yoga & Physical sciences, Yoga & Management studies & Yoga & Humanities.

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